WORLD PETROLEUM

SEPTEMBER, 1961

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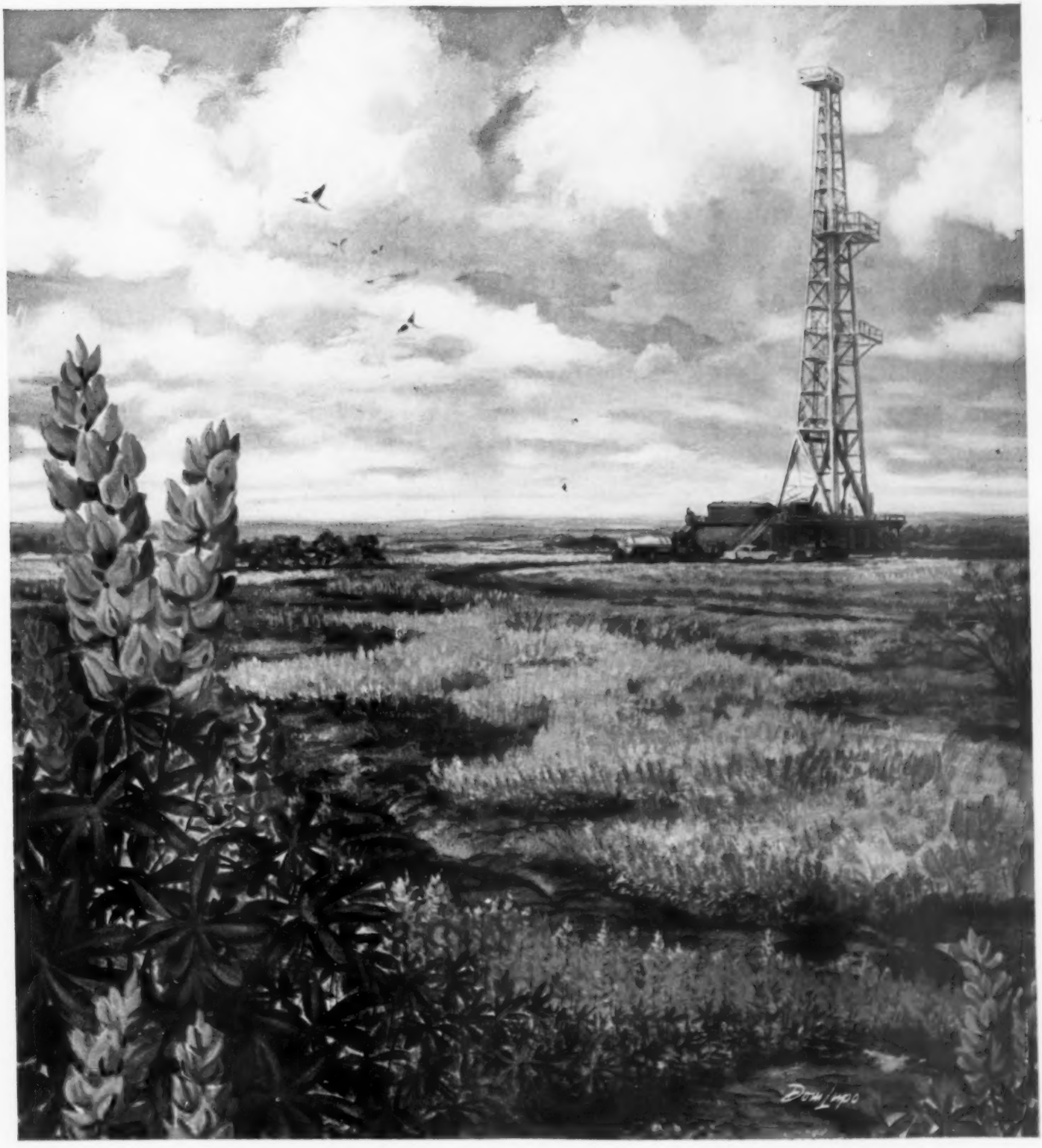

Pemex Director General discusses Mexico's oil — Page 42
World oil consumption to rise 6.3% in 1961 — Page 46

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Central America's First Oil Refinery Is Largest Prefab Oil Refinery Ever Built

The largest skid mounted oil refinery ever constructed has just been installed near Puerto Matias de Galvez, Guatemala, for the Breaux Bridge Oil Refining Company, Inc.

This 4,000 barrel-per-day refinery was designed by the Houston office of The Lummus Company to meet an unusual set of conditions in the rain forests of Central America.

Because of a shortage of labor in the area, Lummus found it impossible to follow its usual practice of employing local craftsmen. In addition, an average of 190 inches of rainfall per year pointed to excessive difficulties in on-site construction. These conditions, coupled with the relatively small size of the process units, suggested the use of prefabricated refinery units that could be built in the United States and shipped to Guatemala.

The refinery consists of atmospheric distillation, naphtha desulphurizing, and catalytic reforming processing units, together with the necessary supporting offsite facilities.

Lummus evolved the plan of mounting pumps, compressors, exchangers, accumulators, etc., for the various process units on steel skids. Large vertical process towers, due to shipping limitations, could not be skid-mounted.

The plant was carefully designed so that when assembled and completed it could be easily operated and maintained. The design resulted in the use of seven process equipment skids—four are pictured above—plus two compressor skids.

Prefabricating and prepackaging techniques were also used in the design and transporting of heaters, boilers, electric generation equipment, water system pumps, and even refinery personnel housing.

Lummus felt that this design concept had many advantages. Design, procurement, and construction schedules could be overlapped to a much greater extent than usual, resulting in a shorter completion schedule and many economies. Also, better quality control could be maintained. Construction was completed in 10 months after clearing of the dense jungle jobsite. It is estimated that the same refinery, constructed by conventional means, would have taken about 15% longer, and because of the necessity of importing craftsmen for the distant jobsite, it would have cost about 10% more.

The portable plant technique is one that Lummus knows well. Ten years ago, the company built a similar, but smaller, skid-mounted portable refinery for the U. S. Navy. Lummus has also designed and constructed transportable pilot plants for the Wulff acetylene process, a refinery pilot plant, an atomic reactor test loop, and a nitrous oxide unit among others.

If you have a construction problem which might be solved through this technique, Lummus would be pleased to discuss it with you.

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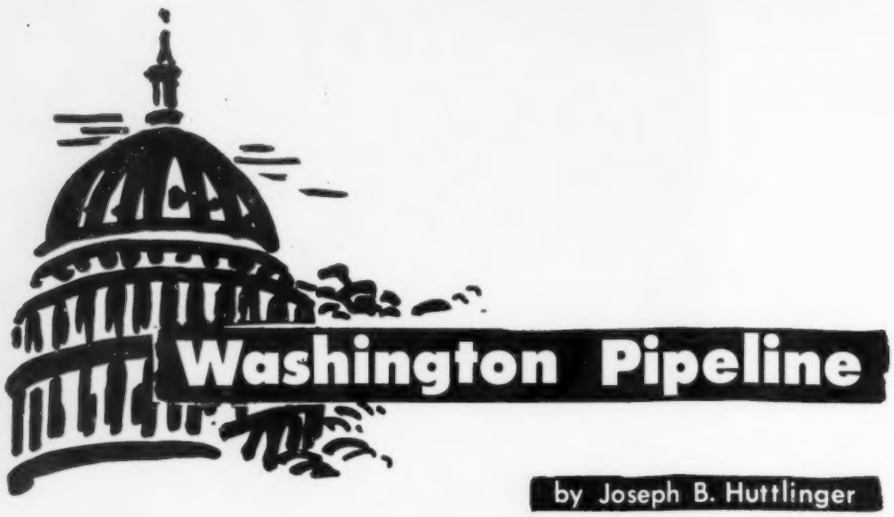
THIS MONTH'S COVER

Bluebonnets identify this drilling rig in Texas, adding another well to the state's 190,000 producers. Photo is reproduced through the courtesy of William H. Walsh, managing editor of Service, house magazine for Cities Service Co.



Washington Pipeline

by Joseph B. Huttlinger

Expect Import Controls to Continue

Secretary of the Interior Stewart L. Udall is certain to continue the program to limit imports of crude oil and of finished products when he announces the results of his public hearings last spring. Target date for announcing the changes in the current program is Oct. 15.

Present thinking, however, is for certain changes in the mechanics of the program. Thus, there is widespread sentiment for tying the total imports to a percentage of past production of US crude oil rather than, as now, to an estimate of future demand. This would make the program simpler, by tying it to a firm figure rather than an estimate.

There is growing sentiment for "phasing out" the benefits to historical importers, and putting them, too, closer to a percentage of refinery runs.

There is strong sentiment to end the sliding scale basis as presently in effect, in favor of a two-part scale dividing the big and the small refiners. The bigs would receive a smaller percentage of their runs in imports than the smalls.

Finally, there is growing disposition to put some curbs, at least, on oil imports from Canada and Mexico, which have been rising at a rapid rate under the present exemption.

By and large, there is a feeling that the present basis of the program—a percentage of refinery runs—is the soundest way to run the program. Alternates—such as ties to production—are proving complicated. Big question is what level of imports to allow. The general sentiment is that the present level, but no higher, is in the ball park. Quotas by source of the crude oil are winning little sympathy.

New FPC Chairman Makes First Talk

The new chairman of the Federal Power Commission, Joseph C. Swidler, made three points in his first talk to members of the gas industry late in July.

He said it's settled that the FPC has the job of regulating prices of independent producers of gas. "We have our marching orders" from the US Supreme Court, he said, and if anyone objects, he should take it up with Congress.

He said the FPC will provide the incentives for producers to find and develop natural gas. "The commission can and should consider the necessity for incentives to insure that supplies of gas keep pace with mounting demands," he asserted.

Finally, he promised "to regulate fairly" in the interest of producers, pipe lines, distributors and consumers.

He feels that "the most serious problem" before the commission is to work out a means of regulating prices of gas of independent producers. He warned industry against taking the short look at problems by telling of a gas company that is now stalled in a rate case by a precedent that the company, itself, helped establish.

Swidler's words may win general approval, but the fact is that they are broad. In fact, Swidler could be true to his words and yet rely on either costs or value in setting prices of gas of independent producers; he could continue or end the effort for area price ceilings; and he could exempt all producers selling less than, say, two billion cubic feet of gas from regulation, a move he is seriously considering. So, it will need actions of Swidler to show how he is going.

O'Connor Satisfies the Senate

Lawrence J. O'Connor of Houston, the first Texan ever to serve on the Federal Power Commission, came through a Senate consideration of his qualifications for the post with flying colors.

Sen. William Proxmire, D., Wisc., was the only witness against him at the Senate Commerce committee hearing, and committee members defended O'Connor against attacks.

Proxmire said he had checked into the man and found him a person of "character and integrity" but he still objects because he has an oil background—Goldston Oil Corp., 1945 to 1958, and vice president and director of the Independent Petroleum Association of America.

Five committee members insisted O'Connor would call the shots as he sees them and that being an oil man is no black mark in a man's record.

O'Connor turned over to the committee a list of 33 oil and related stocks which he is selling and of 47 others which he is keeping.

Tennessee Gas Proposals Rejected

The nation's largest natural gas company has been rejected twice in the first major actions of the new Federal Power Commission.

Tennessee Gas Transmission Co. of Houston, Texas, was refused permission to substitute 18,300 hp of compressor capacity instead of 158 miles of gas pipe line which had been authorized by the FPC some time ago. The cost of the compressor capacity would be $6,126,000 and of the pipe lines $27,384,000.

TGTC also was refused permission to become an intervenor in the proposal of El Paso Natural Gas Co. of El Paso, Texas, and Colorado Interstate Gas Co. of Colorado Springs, Colo. The two gas companies propose a $150 million project of more than 1,000 miles of gas pipe line to carry gas from the Rocky Mountain area to Southern California.

The commission, with two appointees of President Kennedy making their first major rulings, said that the shift from pipe line to compressor capacity is a "proposed major change" that deserves full hearings, that Tennessee's statements are "inconsistent," and that Tennessee has shown "disregard" of FPC's earlier directions. Finally, the FPC said, Tennessee has come forth with no adequate facts about the cost of gas under the alternate proposal, and the compressor program seems to rely on "a questioned source of gas" subject to another FPC proceeding.

The new attitude of the commission is seen in the fact that chairman Jerome Kuykendall of the FPC, dissented, and would have given Tennessee what it seeks. Another holdover, Commissioner Arthur Kline, concurred only in the result. So, the wording is the work of the newcomers, Commissioners Swidler and Morgan.

In the El Paso case, the commission pointed out that Tennessee is backing a project for a line of more than 1,000 miles through Mexico to Southern California. Tennessee apparently feels that if it can block the El Paso project, there would be a better chance for the Mexican line.

The commission ruled, however, that there "would be no competition" between the two projects and there has been no showing that the projects are "mutually exclusive." So, it said Tennessee cannot enter the El Paso case at this late date.

Navy Answers Flood's Query

The job of educating members of Congress to workings of the oil and gas industry is one that never stops.

Thus, Rep. Daniel J. Flood, D., Penna., called it "larceny" for an oil producer to take oil out of the ground when it drains a government naval reserve. He said he is shocked that there is no law to curb the producer.

Naval Petroleum Reserve officials tried to explain that this is the way the oil industry works, but they made little headway. Later, they filed a prepared statement with Flood's committee explaining it is "reasonable" that a man be able to produce oil from his own property. Anything else, the statement said, would be "of doubtful legality."

The matter came up as the Navy asked for $2,500,000 for the oil reserves for the coming year, some $455,000 of it to drill 18 more wells near Teapot Dome, Wyo., to prevent drainage. In later years, the Navy plans to ask another $700,000 for 30 more wells. Some 27 wells were completed in the last few years.

Capt. K. C. Lovell, director of the reserves, said that the major reserve at Elk Hills, Calif., has one billion barrels of recoverable oil. He said it could produce 200,000 b/d, but that actual production is 12,000 b/d. The Navy has 961 oil wells in the field, he said.

FTC Chairman Sees No Competition in Oil

Paul Rand Dixon, the new chairman of the Federal Trade Commission, one of the major antitrust agencies of the government, is making a record of alarming statements and actions.

He said he sees "little or no real price competition" in oil. He sees bigness as such "a very definite problem." He has made a new pitch for passage of S. 11, a measure to curb price discrimination further, and one which major oil companies consider "impossible to live with." And, he wants more than the power for the FTC to ask the courts to issue temporary injunctions when the FTC files a complaint. He wants power for the FTC, itself, to issue the injunction. Bills are pending on the subject, amid signs they will get moving next year.

Many business executives feel that use of a temporary injunction is punishment before trial.

MPSA Purchases Rise

Military Petroleum Supply Agency bought more oil for less money in fiscal 1961 which has just ended than in fiscal 1960, it is reported by the agency.

Total purchases came to 279,871,000 barrels in fiscal 1961, against 266,200,000 barrels in fiscal 1960, a gain of 13,671,000 barrels.

Total cost was $1,080,469,000 in fiscal 1961, against $1,092,691,000 in fiscal 1960, a drop of $12,222,000.

In the year ahead, MPSA foresees a drop of 6,000 b/d or 6% in aviation gasoline purchases; an increase of 6,000 b/d or 1.8% in jet fuels; a gain of 6,200 b/d or 10.8% in diesel fuels; and a gain of 10,000 b/d or 8.3% in Navy special fuel.

Mines Bureau Forecasts 1961 Demand

The US Bureau of Mines now estimates total US demand for petroleum products in 1961 at 10,024,000 b/d, a gain of 1.5% over 1960. The domestic demand, which excludes exports, is put at 9,837,000 b/d, a gain of 1.7% over 1960.

The bureau says domestic demand for gasoline will be 4,232,000 b/d, up 2.1%; for kerosine 394,000 b/d, up 8.8%; for distillate oil, 1,910,000 b/d, up 1.9%; for residual 1,506,000 b/d, down 1.6%; for all other products 1,795,000 b/d, up 1.8%.

The bureau estimates crude oil production at 7,142,000 b/d, up 1.5%, and other oils at 988,000 b/d, up 4.9%.

Imports of crude oil are put at 1,030,000 b/d, up 1.5%, and of oil products at 825,000 b/d, up 2.6%.

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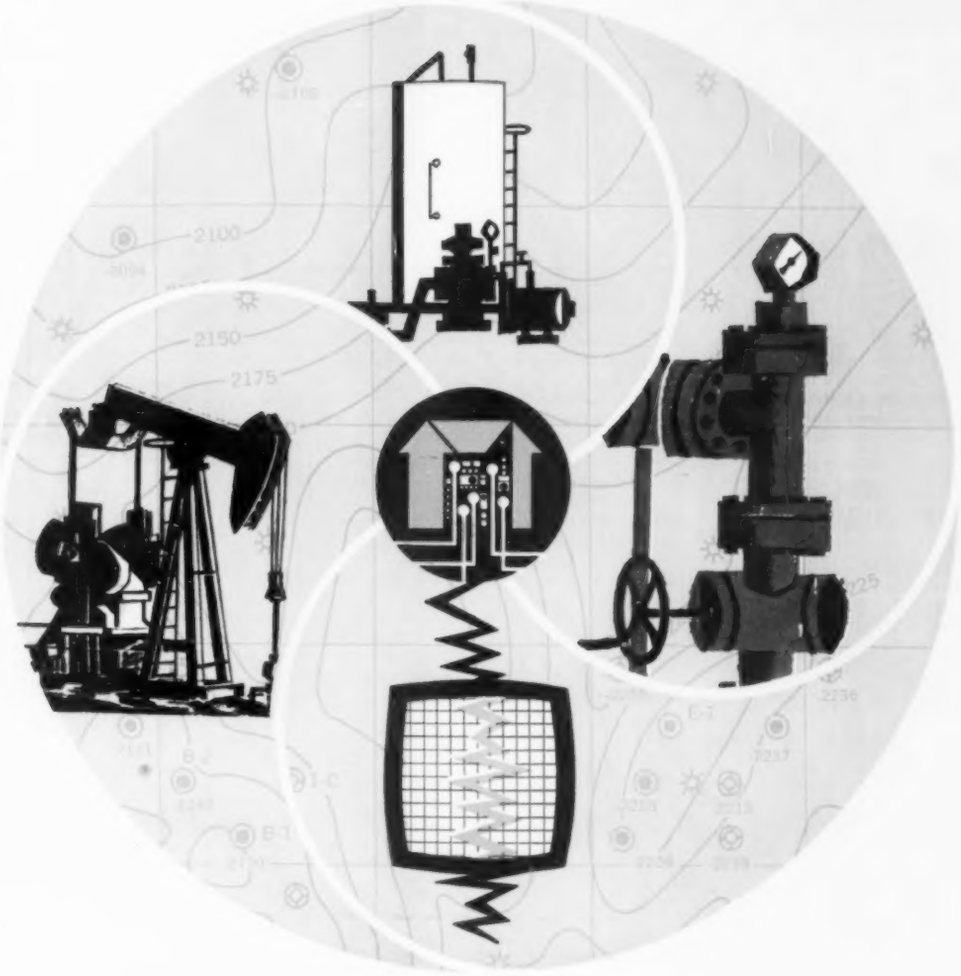

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UK Oil Trade in the Half-Year

Crude oil imports in the first half of 1961, at 189,594,000 bbls, were up 29,055,000 bbls (18.1%) as compared with the same period of 1960. Refined oil imports, at 45,731,000 bbls, were down 8,982,000 (16.4%); and total imports — 235,335,000 bbls (1,300,190 b/d) — were up by 20,083,000 bbls (9.3%).

This is latest picture of UK import trade in essence, the details being given in the accompanying table.

Refinery throughout (first four months only) has risen 2,571,800 tons (18.7%); finished product output (refinery fuel excluded) is up 2,488,000 tons (19.6%); and output of gas/diesel and fuel oils is higher by 2,121,800 tons (26.5%).

Total deliveries into inland consumption show a rise of 1,085,600 tons (8.0%); those of gasoline are up 155,100 tons (6.8%); and gas/diesel and fuel oil deliveries have risen by 691,600 tons (9.0%). Feedstock deliveries for gas works are higher by 47,100 tons (31.3%), while those for petrochemical plants show indications of a slowing up, for the rise is only 20,800 tons (4.1%).

"Veedol" Motor Oils for UK Market

Competition for motorists' favor in the British lubricating oil trade, already tense, is bound to increase with the introduction of "Veedol" brands by Veedol (U.K.) Ltd., part of J. Paul Getty's Tidewater group.

This company, previously known as Tidewater Oil Co. (England) Ltd., has links with the U.K. market going back to 1929 through Clarendon Petroleum Co. Sales, however, were confined to base lubricating stocks in bulk, which continue as before.

Five grades of motor oils have been introduced but the intention is to extend the range gradually to meet all the requirements of motorists. Veedol expects to achieve national coverage within twelve months.

CBMPE Progress in 1960/61

Membership of the Council of British Manufacturers of Petroleum Equipment totalled 518 in June, 49 new firms having joined during the year, according to the report of its chairman—J. M. Storey, CBE—on the progress of the Council in 1960/61.

Referring to the work of the CBMPE subsidiary, British Oil Equipment Credits Ltd. (BOEC) and its excellent service under G. V. Sims—who is also director of the Council—in giving members the opportunity to share in the £7 million financing agreement with Pemex, says:

"I am convinced that if we are to extend this business it will be necessary for someone to concentrate on interesting other potential customers. I am equally certain that to expect our director to undertake this dual task is asking too much of him and I feel the time has now arrived when the appointment of a deputy director should have serious consideration. Such an appointment would enable Mr. Sims to give more time to extending the activities of BOEC."

Expansion at Spondon

The report of Courtaulds Ltd. for the year ended March 31, 1961, states that the petrochemical plant at Spondon (Derbyshire) was expanded during 1960, and that further extensions to the cracking unit are due to be completed end-1961. The vinyl acetate unit is being extended and a number of new plants are under construction, including a unit to produce pure benzene, toluene and a xylene fraction from an aromatic by-product.

The company also has plans for a 10,000 ton/yr plant to produce caprolactum monomer—based on toluene to be made at Spondon. This follows the purchase of the British rights in the new process of Snia Viscosa, a company in which Courtaulds holds a minority interest.

Oil-from-Coal Plan Dropped

"I accept the Wilson Committee's view that the prospects of making oil from coal economically in this country are so remote that no further technological work on the development of this process should be undertaken at present," the Minister of Power told Parliament recently when asked what action he had taken on this committee's report. The Department of Scientific and Industrial Research has consequently wound up its development work on this process (Mr. Wood went on), but is continuing basic studies on catalysis and is keeping in touch with developments in making oil from coal.

Castrol Enters Plastics Field

Castrol Ltd. is further diversifying its already varied interests by entry for the first time into the British plastics field. This is through the acquisition of 75% of the share capital of Melwood Thermoplastics Ltd. and the entire capital of its associated company Tensile Products Ltd.

Courtaulds' US Expansion with Koppers

At a cost of some £1.5 million, Courtaulds Ltd. has acquired some 4% of the $30 million common stock of Koppers Co. Inc., a US chemical and plastics manufacturer which has a common shareholders equity worth $138 million and whose 1960 sales totaled $303 million, of which chemicals and plastics accounted for $69 million. Two Courtaulds directors have been elected to the Koppers board.

Shell Tanker Developments

The 65,000-dwt tanker "Solen", recently launched for Shell from the Wallsend yard of Swan, Hunter & Wigham Richardson is not only one of the biggest ships built on the Tyne but also the heaviest. Fully loaded she will have a displacement above that of the "Queen Elizabeth".

H. Wilkinson, chairman of Shell Tankers, said at the launching that his group was coming to the end of the building program contracted for in 1955, and as a heavy surplus in world tanker tonnage was likely to prevail for some time Shell could not reasonably be expected to order more ships until a closer balance between supply and demand could be seen.

Appointments

A. V. BILLINGHAME and **P. J. MARCH** have been appointed directors of Shell Chemical Co. Mr. Billinghame has in recent years been concerned with the international sphere and he will continue to be the regional coordinator (UK, Central and South America) with Shell International Chemical Co. Mr. March has since 1960 been general manager of Shell Chemical's industrial chemicals division.

P. J. March

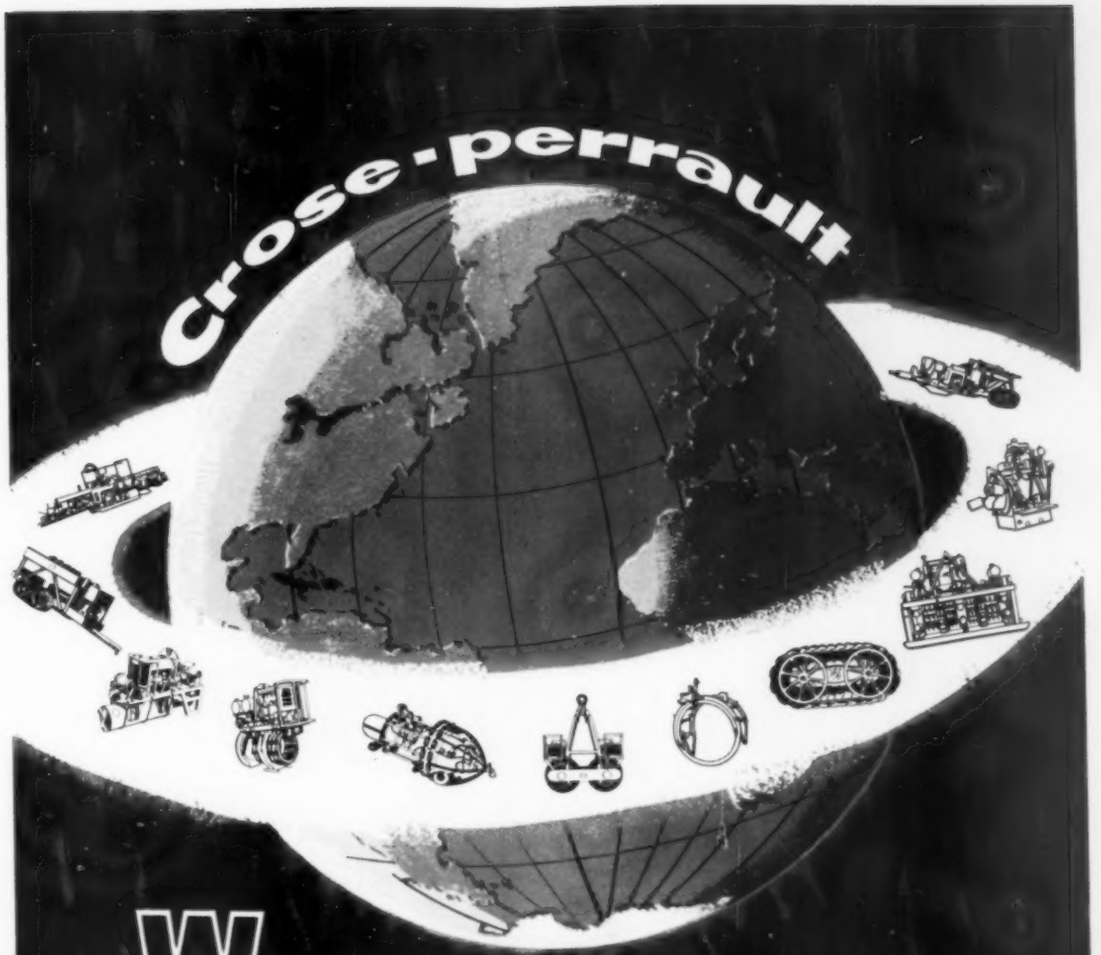
A. V. Billinghame

HAROLD W. STONEHAM has been made manager of Esso Petroleum's producing department which will have charge of the oil and gas exploration work now starting in southern England. Geological and geophysical work is in the hands of Seismograph

(Continued on page 10)

UK IMPORTS/EXPORTS—JAN-JUNE

	Volume in 1,000 barrels		Value in £M	
IMPORTS:	1961	1960	1961	1960
Crude and partly refined oil:				
Eastern Hemisphere:				
Middle East	149.472	127.630	141.2	127.0
Africa	4.567	2.644	4.5	2.7
Europe	1.600	1.323	2.5	2.7
Far East and Australasia	568	508	0.9	0.7
Total	156.207	132.105	149.1	133.1
Western Hemisphere:				
Latin America	30.415	17.339	31.9	30.4
North America	171	171	0.3	0.3
Total	30.586	27.510	32.2	30.7
Unallocated:				
Commonwealth	749	533	0.9	0.7
Foreign	2.052	391	2.2	0.5
Total crude	189.594	160.539	184.4	165.0
Refined oil:				
Motor spirit	12.180	11.569	22.6	21.4
Spirit, other than motor spirit	1.391	1.125	2.0	1.8
Kerosine	2.412	2.913	4.1	5.0
Lubricating oil	2.147	1.977	7.5	7.0
Gas oil	8.735	9.077	13.3	13.8
Diesel oil	381	341	0.6	0.5
Fuel oil	18.485	27.711	17.2	27.3
Total refined	45.731	54.713	67.3	76.8
Crude and refined	235.335	215.252	251.7	241.8
EXPORTS:				
Total liquid exports	28.667	33.633	43.1	49.4
Re-exports	318	859	0.6	1.4
Bunkers (foreign trade)	14.798	13.818	—	—



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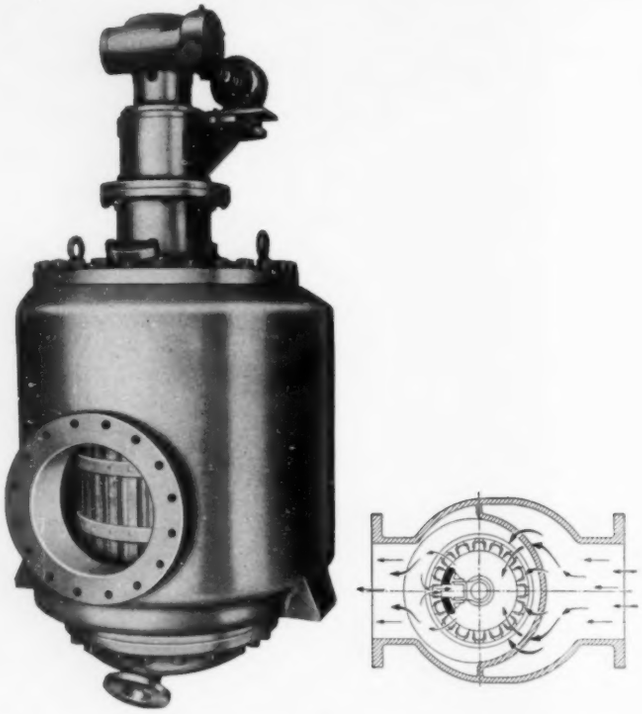


Shown above is the famous Elliott type K self-cleaning strainer, designed for cleaning water containing large quantities of foreign matter. Diagram shows how it cleans itself—automatically. A revolving sealing box seals off and cleans one unit after another continuously by a reversal of flow of clean water from the discharge side of the strainer. Maintenance is small, saving many man-hours. Available in 4-in. to 36-in. sizes.

Elliott also offers advanced-design Twin and Single strainers for every industrial need. Today, Elliott strainers are protecting billions of dollars' worth of equipment around the world.

Other fine Elliott products include induction motors, synchronous motors, Crocker-Wheeler integral HP motors, motor-generators, turbine-generators, ejectors, mechanical drive turbines and centrifugal compressors.

For information on any of these products, send coupon to Industrial Equipment Sales Dept., Carrier International Ltd., 385 Madison Avenue, New York 17, N. Y.; Carrier A. G., Zurich, Switzerland, or Carrier-Lix Klett S. A., Buenos Aires, Argentina.

Carrier

Please send complete information on _____ (products)
to the following address:

Name _____

Address _____

City _____ Country _____

London Letter

(*Continued from page 8*)

Service (England) Ltd. **E. G. DINDROTH,** formerly a director and senior vice president of Esso International, has now taken up duties in London as European financial representative for the treasurer's department of Standard Oil (New Jersey).

C. M. VIGNOLES, who retired recently as managing director of Shell-Mex and B.P., has been appointed chairman of Evershed & Vignoles Ltd., the well-known electronic instrument firm. He succeeds **J. C. NEEDHAM,** who has retired.

C. A. HARRISON has been appointed manager of the technical services department of Iranian Oil Services Ltd. in London, replacing **L. E. CHATFIELD,** who has returned to the USA.

R. MORRISON and **A. H. SIMPSON,** secretary and general sales manager respectively of Woodfield Rochester Ltd., have been appointed directors and will continue their former duties.

WILLIAM STARRENBURG has been appointed director of coordination (chemical) for Shell International Chemical Co., succeeding **W. F. MITCHELL,** who has become executive vice president of Shell Oil Co. of Canada.

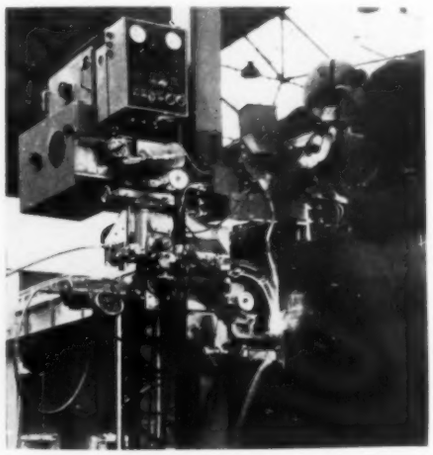
British Equipment News

Kismet Ltd., of Bedford, has reached a long-term agreement with Tokheim AG, of Lucerne, for the production of the latter's gasoline pumps and other products in the UK and also the exchange of ideas and designs. The pumps will be offered for sale shortly.

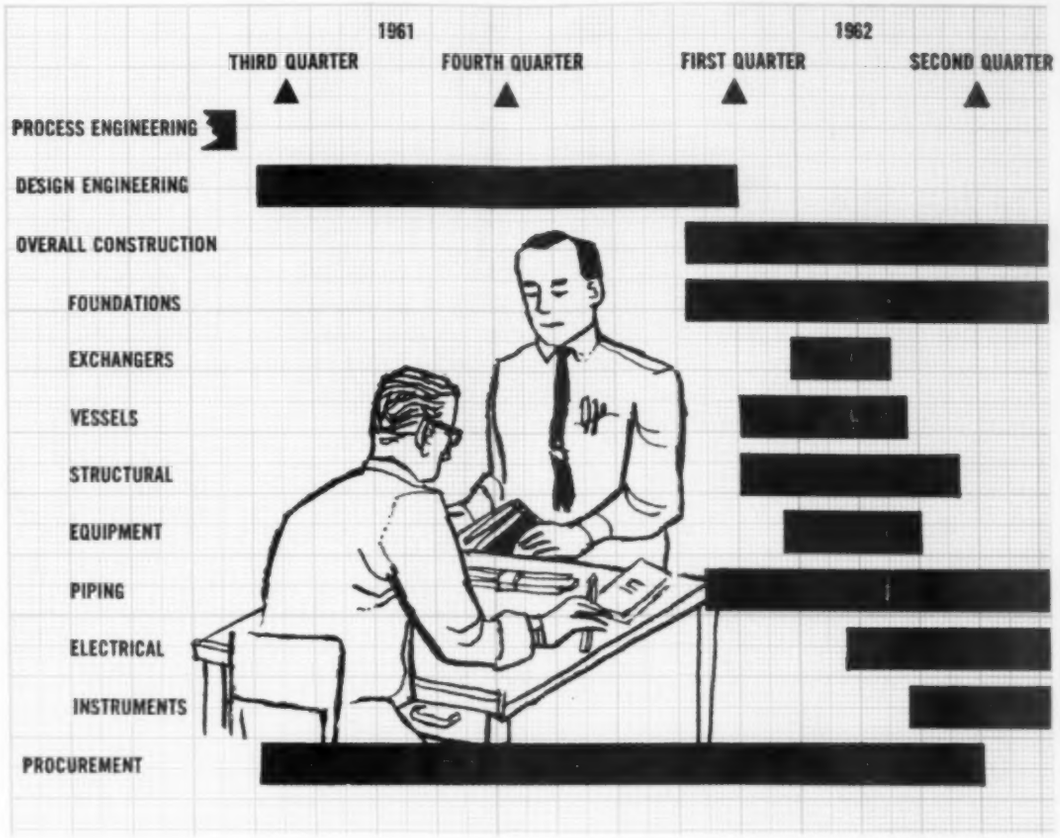
F. Perkins Ltd., of Peterborough, has signed an agreement with the West German patent holders to make NSU Wankel rotary engines under license in the UK. This will enable Perkins to manufacture gasoline marine motors and diesel motors but as extensive commercial development work is planned, it is stated to be unlikely that Wankel motors will be marketed for some time.

C. A. Parsons & Co. Ltd., of Newcastle upon Tyne, has signed a license agreement with Zallea Brothers, of Delaware, for the manufacture of thinwall-bellows expansion joints of Zallea design and their sale in the UK, the European Free Trade Area and the British Commonwealth (except Canada).

Lake & Elliot Ltd., founders and engineers of Braintree (Essex), has incorporated two new subsidiaries because of expanding business and the need for greater specialization. These are Lake & Elliot Jacks and Equipment Ltd. and Lake & Elliot Founders and Engineers Ltd.



The Wallsend shipyards of Swan, Hunter & Wigham Richardson are now using the first two British machines for vertical automatic plate welding. These have been developed and manufactured by *The British Oxygen Co.* at its Gateshead works and use the SUBARC process, BOC's version of electro-slag welding. The welding head is mounted on a carriage which travels up a vertical column at a speed controlled by a differential thermocouple system.



Progress Continues at Kellogg on Monsanto's New Phenol-from-Cumene Plant

The largest phenol-from-cumene plant in the United States is now in the mechanical engineering stage at Kellogg's New York Offices. Designed to produce 75 million pounds per year of high purity phenol, plus large quantities of acetone, the plant will be built at Chocolate Bayou, Texas, for Monsanto Chemical Company.

Full responsibility for engineering, procurement, and construction has been assigned to The M. W. Kellogg Company. A major portion of the process design is based on information licensed from Hercules Powder Company.

Feeds to the cumene section will be benzene and propylene; both will be produced by Monsanto at Chocolate Bayou. Feeds to the phenol section will be cumene and air. The entire project, part of the huge multi-million-dollar chemical complex Monsanto is building at Chocolate Bayou, is scheduled for completion in the summer of 1962.

Kellogg-Monsanto teamwork at Chocolate Bayou is another example of Kellogg's active participation in helping chemical, petrochemical and refining companies achieve their broad investment goals. To obtain information on how the Kellogg organization can translate your new-plant investment into the finished plant, you are cordially invited to contact The M. W. Kellogg Company.

THE M. W. KELLOGG COMPANY

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HERCULES

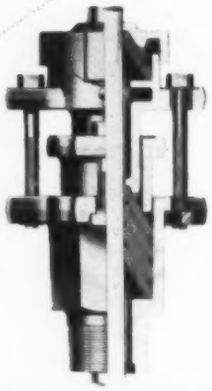
CONE PACKED STUFFING BOXES

For general service Hercules Stuffing Boxes are constructed from malleable iron. For service on wells with corrosion or electrolytic conditions, Hercules Stuffing Boxes are available made from other test-proven metals.

PREFERRED for 34 years by Experienced Oil Men

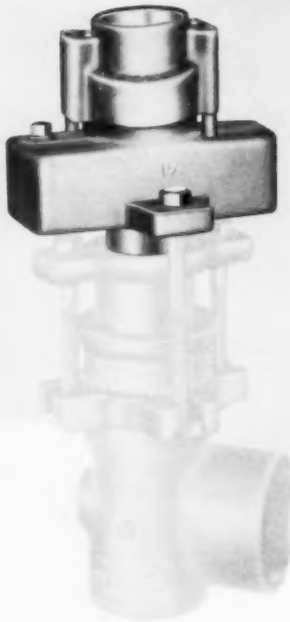
HERCULES REGULAR TYPE DUPLEX STUFFING BOX

More efficient operation with fine adjustment possible. Offers longer packing life due to ability of Packing and Glands to follow lateral movement of Polished Rod. Malleable iron construction prevents breakage if rods are accidentally dropped on Stuffing Box. Has male thread to screw into Pumping Tee.



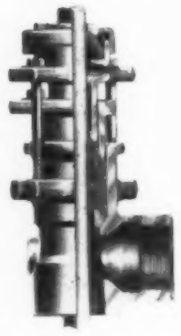
HERCULES OIL RESERVOIR GLAND

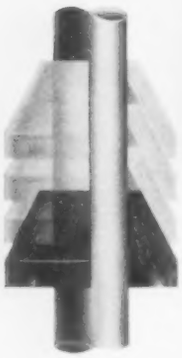
All Hercules Stuffing Boxes may be equipped with *Oil Reservoir Upper Glands* for *problem* wells which pump off and burn packing. The polished rod runs through the Reservoir, and is cooled and lubricated by its fluid.



HERCULES TEE TYPE DUPLEX STUFFING BOX

A combination Tee and Stuffing Box only 15" high. Eliminates one threaded connection between Stuffing Box and Tee. Full opening—allows rods to be run or pulled without removing Stuffing Box body. Has female thread to screw directly onto tubing.



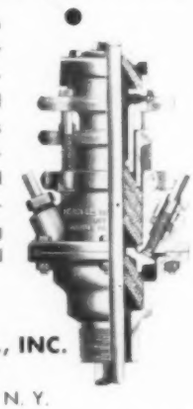


HERCULES CONE-SHAPED PACKING RINGS

Each set of rings contains a solid ring as the bottom one. This provides greater contact with the polished rod and a more substantial base for the upper ones. This results in longer packing life and superior performance. A complete set consists of three *regular* and one *bottom* ring.

HERCULES TYPE DP (Double Packed)

Duplex Stuffing Box for use on high pressure or intermittently flowing wells. Allows Main (upper) Packing to be safely and easily replaced while well is under pressure. The two compression bolts (A) are turned clockwise until the lower Packing seals off. The Main Packing can then be removed and replaced.



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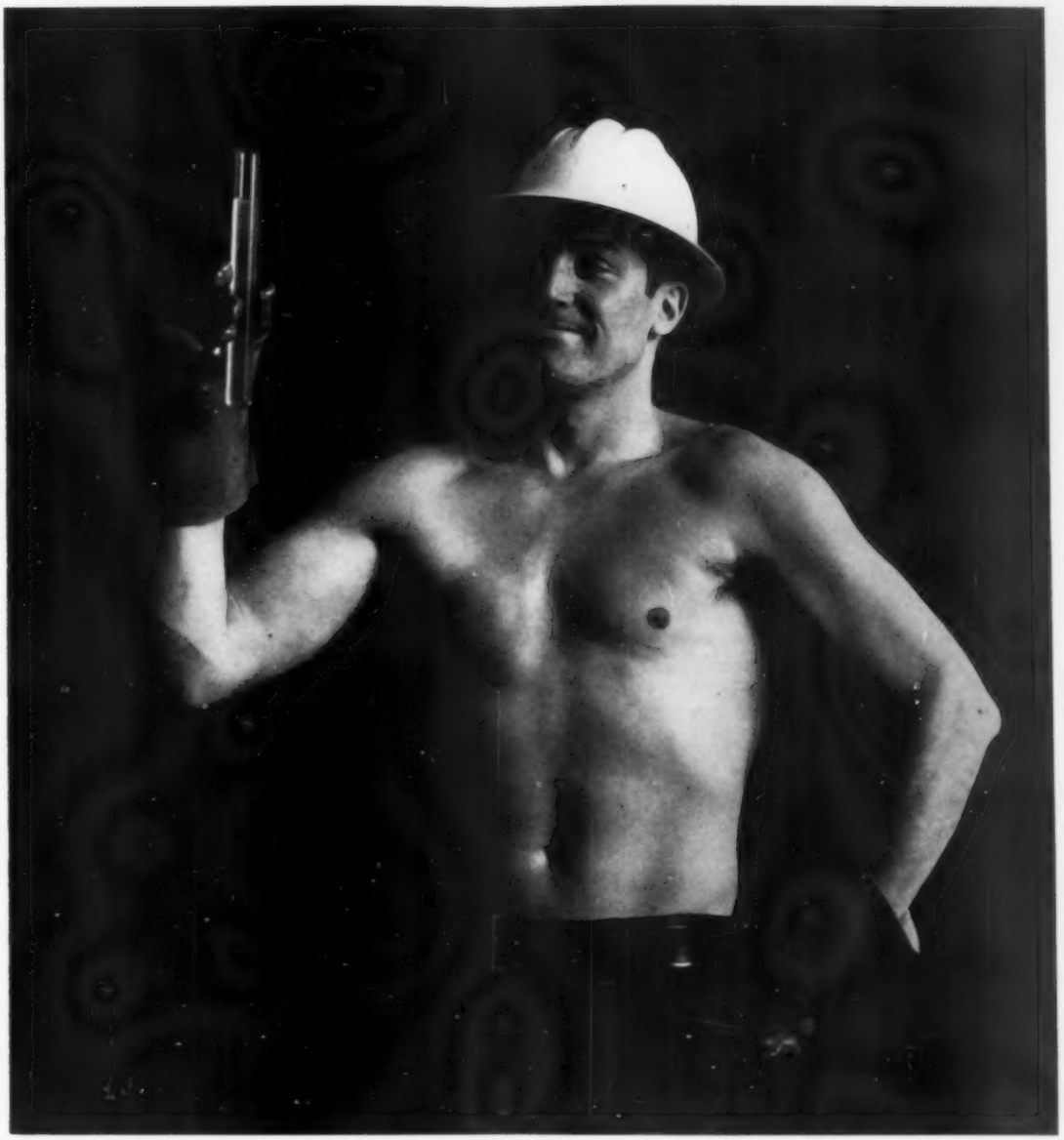

The oilman doesn't know his own strength. Not all oilmen may realize it, but from petroleum come some of the strongest substances known to man—Epon® resins. These resins are so strong they can replace the rivets in airplane wings! And perhaps oilmen don't always realize their strength in another way—the many vital contributions they make to our everyday life. Thousands of products have been made possible by petroleum research. And what makes that possible? You, the oilman. So the next time you hear someone speak out against oil, remember you've good reason to speak up. After all, you're helping make petroleum one of the world's most versatile natural resources.

SHELL OIL COMPANY

CANADIAN NOTES

Go-Ahead For Gas Marketing

Three companies were given the go-ahead late in June to gather and market Alberta's natural-gas liquids by the Alberta Oil and Gas Conservation Board. The firms include Britamoil Pipe Line Co. Ltd., a subsidiary of British American Oil Co. Ltd., Hudson's Bay Oil & Gas Co., an affiliate of Continental Oil Co., and Royalite Oil Co. Ltd.

The board's ruling in effect gives strength to its contention that reserves of natural-gas liquids are not sufficient to justify large scale exports. It turned down three other applications for an integrated pipeline system to transport sizeable volumes of gas liquids out of the province. Rejected for the time being were applications by Westalta Products Pipe Line Ltd., Provincial Products Pipelines Ltd., and Hydrocarbons Pipeline Ltd.

Britamoil was granted a permit to build an 8-5/8-in. line from Rimbey gas plant to the B-A refinery at Edmonton. The line will carry condensate primarily, but will be capable of transporting butane and propane when required. The line will have a capacity of 32,500 b/d, with initial capacity slated at 21,000 b/d.

Hudson's Bay receives a permit to build a gathering system from the Waterton-Pincher Creek-Lookout Butte gas fields in southern Alberta. The pipeline would connect near the Alberta-Montana border with the 433-mile system operated by Continental Oil Co. in the USA. The Hudson's Bay connection will give the province the second north-south pipeline to the USA Alberta-Montana Gas Pipe Line Co. presently taking gas from Alberta for Montana consumers. Capacity of the Hudson's Bay line is expected to reach 31,000 b/d of condensate.

Royalite Oil was permitted to construct a line for transporting natural gasoline and condensate from the Wildcat Hills, Jumping Pound, and Sarcee gas fields to the Calgary refinery area. Capacity of Royalite's line is designed for 3,600 b/d.

All three successful applicants have until March 31, 1962, to start construction of the systems. All of them, however, plan to start construction late this year.

Canada Southern in Arctic Islands

Recent political and economic developments have highly favorable implications from owners of presently undeveloped and undelineated oil reserves in areas of northeast British Columbia where Canada Southern Petroleum Ltd. is well represented, according to John W. Buckley, Canada Southern president.

In an interim stockholder report, Mr. Buckley described as of "special significance" to Canada Southern the commencement of construction of a 12-inch pipeline to take crude oil and gas plant liquid products from northeast British Columbia to refineries in Vancouver. This pipeline, when completed late this year, will afford British Columbia operators a preferential market, which at present is 70,000 b/d. It was stated that refineries in the Vancouver area will give preference to British Columbia crude.

The interim stockholder report also announced that Canada Southern would participate in drilling of the first well in the Arctic Islands this winter. The syndicate, headed by Dome Petroleum Ltd., will drill the well to an estimated depth of 10,000 ft. on Melville Island.

Manitoba's Demand at 12,900 b/d

Demand for Manitoba's oil in July, August, and September appears constant at 12,900 b/d, according to Manitoba Department of Mines and Minerals.

Buyers' nominations indicate Imperial Oil Ltd. is buying 93% of the daily output with the other main purchasers being British American Oil Co. and Canadian Oil Companies Ltd.

The province's daily output is close to Manitoba's producing potential.

Canadian Husky Buys Merit's Assets

Canadian Husky Oils Ltd. has purchased all assets of Merit Oil Ltd. Officials of both companies announce that in addition to the $1,750,000 worth of accounts and notes receivable, Canadian Husky acquires all shares of Provincial Products Pipelines Ltd.

Provincial Products has an application before the Alberta Conservation Board to construct a gathering system for natural gas liquids.

Canadian Husky's purchase includes Merit's interests in four producing oil wells, leases, reservations and royalties.

Canadian Husky will assume Merit's liabilities estimated at $500,000 and will issue to Merit 50,000 common shares and warrants to buy an additional 390,000 common shares of Canadian Husky Oil Ltd. at $14 per share exercisable on or before December 14, 1964.

Merit's shareholders approved the agreement at the extraordinary meeting in Calgary, March 24.

Clark Compressor Appointments

Clark Compressor Co., Ltd. has announced two new sales appointments. J. Eugene McCarthy has been named Canadian district manager for the company with offices in Calgary, Alberta, and John Pyles has been appointed Toronto branch manager. McCarthy's appointment fills the vacancy created when James D. Gilbride was named California district manager.

Oil Trade Up

Canada's balance of trade in crude oil and products is taking a big turn for the better. New imports increased from 10,504 b/d in January to 49,816 b/d in April. Sudden turnaround has brought estimated reductions rising from 28,569 b/d in May to 129,580 b/d in July.

Alberta Nets $11 Million

The Swan Hills-Judy-Creek Beaverhill Lake oil producing regions of Northern Alberta continues to attract the oil and gas industry.

Late in April, the Alberta Government sold more than 40,000 acres of petroleum and natural gas leases for cash bonuses of $11,134,020.44.

Of the 27 firms and groups obtaining successful bids, Imperial Oil Ltd. tendered $3.2 million for parcels in the Judy Creek area. Top price per acre in this area averaged $2,036.

Mobil Oil of Canada, Ltd. paid $1.7 million for three tracts in the Carson Creek area. Pan American Oil Corp. paid out bonuses totaling $1.3 million, Hudson's Bay Oil and Gas Co., Ltd., paid $1.1 million for parcels in the Swan Hills area, and Atlantic Refining Co. paid $1 million for two parcels in Carson Creek.

B. C. Gas Reserves

British Columbia gas reserves are short by about one trillion cubic feet of being able to meet requirements of present export permits, said National Energy Board in a report on reserves at end of 1960. The board intimated no further export permits will be granted until adequate further reserves are found.

Gas Plants Down

Need for gas processing plants in Alberta wet gas fields has sagged badly from original estimate of 23 units for new export contracts. Seven biggest plants now in operation or building can handle 120% of total supply. Few others will go ahead in 1961.

Westcoast Net Up

Annual report of Westcoast Transmission Co. Ltd. showed first net earnings, for fiscal year ended March 31, 1961: $185,214 net, compared to $915,794 deficit previous year. Expected throughput this year is 350 mmcf/day, up from 293 mmcf/day last year. Plans for big expansion program with new pipe line to Fort Nelson depend on proving more reserves, may go in 1962 but not sooner.

Production Up

July will set new high level of oil production at 643,598 b/d, up 22% from 528,363 b/d last July, according to purchasers' nominations. Big element is export market of 198,865 b/d, up from 111,835 b/d. Month will feature lowest net imports of crude oil and products for four years, 191,377 b/d, cut off more than half from last July's 388,341 b/d adverse petroleum trade balance.

Trans-Canada Directors

Trans-Canada Pipe Lines Limited has announced the election of five new members to its board.

The new directors are: N. J. McKinnon, president and chief executive officer of the Canadian Imperial Bank of Commerce, Toronto; Beverly Matthews, C.B.E., Q.C., senior partner in the law firm of McCarthy & McCarthy, Toronto; V.W.T. Scully, C.M.G., F.C.A., president and chief executive officer of The Steel Company of Canada Limited, Hamilton, Ontario; R.W. Campbell, vice-president and general manager of Home Oil Limited, Calgary, Alberta, and E.L. Kennedy, partner of Lehman Brothers, New York Investment bankers.

Exploration on Upturn

Exploration in western Canada has taken a good upturn. Number of geophysical crews at work at the middle of May was 36, up from 34 in the previous May. Five-month total of 326 crew-months was down from 354 in 1960, but smallest percentage decline in this period for more than five years.

Combine N.A. Oil Policy

Canadian crude production should reach 2,800,000 b/d by 1980, with 1.6 million going into the USA and 1.2 million being used in Canada, said A. F. Down, president of British Petroleum (Canada), recently. He urged integration of Canadian national oil policy into North American continental policy.

Exploration Regulations

New northern Canada exploration and development regulations are now before dominion cabinet, and should be announced shortly. Two years of study have gone into drafting revisions as result of strong oil-industry protests about terms of present rules.

Well Completions Down

June well completions in western Canada number 201, down 9.5% from 222 wells drilled in June last year. Cumulative completions for half year were 1,032 wells, down 12% from 1,175 last year. Trend is still down. Footage drilled is holding up better because of more drilling in Alberta where depths are greater. Cumulative six-month footage was down 8%.

Personnel Changes

MICHAEL D. REDDIN has moved up to chief development engineer, Canadian Operations, for Richfield Oil Corp. Reddin received his early schooling in Prince Edward Island and is a graduate of University of Oklahoma. He joined Richfield in 1954.

LEONARD R. WOOLSEY was appointed vice president of marketing for British American Oil Co. Woolsey has been general manager of marketing for B-A since 1958.

He was born in Saskatchewan and is an engineer graduate from the University of Saskatchewan. Following his graduation, he joined B-A as salesman and served in several capacities prior to his elevation to his new position.

The appointment of **GEORGE W. WOODS** as vice president and treasurer and **DONALD G. CLARK** as vice president, sales, have been announced by James W. Kerr, board chairman and president, Trans-Canada Pipe Lines Ltd.

W. O. TWAITS has been re-elected president and chief executive officer of Imperial Oil Ltd. Other officers re-elected were: J. A. Cogan, L. D. Fraser, T. F. Moore and V. Taylor, vice presidents. Other directors are: J. A. Armstrong, C. E. Carson, J. W. Hamilton, A. C. Harrop and D. S. Simmons.

JAMES R. McMURRY has been appointed assistant manager of the Texaco Exploration Co. Texaco Exploration, a wholly-owned subsidiary of Texaco Inc., has its headquarters at Calgary, Alberta, where Mr. McMurry will assume his new duties. The company engages in oil exploration, producing and pipe line operations in Canada.

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"Number One" builder of FLOATING ROOF TANKS

CB&I-built floating roof tanks are serving the petroleum industry throughout the world. The reason: superior design, construction and performance of CB&I structures . . . world leaders in reducing evaporation loss, retarding corrosion and minimizing fire hazard.

Typical of CB&I's *Craftsmanship in Steel* are the five Horton® Double-Deck Floating Roof Tanks shown below. Built for a major oil company in Venezuela, each has a capacity of 268,000 barrels.

CB&I also offers the widest choice of seals for floating roofs. These include liquid filled fabric, gas inflated fabric, resilient foam fabric and metallic seals.

CB&I offers the *coordinated services* of a world-wide organization with experienced CB&I erection crews ready to go to work on your job, now. Write for further details.

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General's extensive laboratory facilities offer you an important flexibility—equipment and instruments can be quickly custom designed and manufactured to fit the special needs of a job, to fit a special area and to fit your special requirements.

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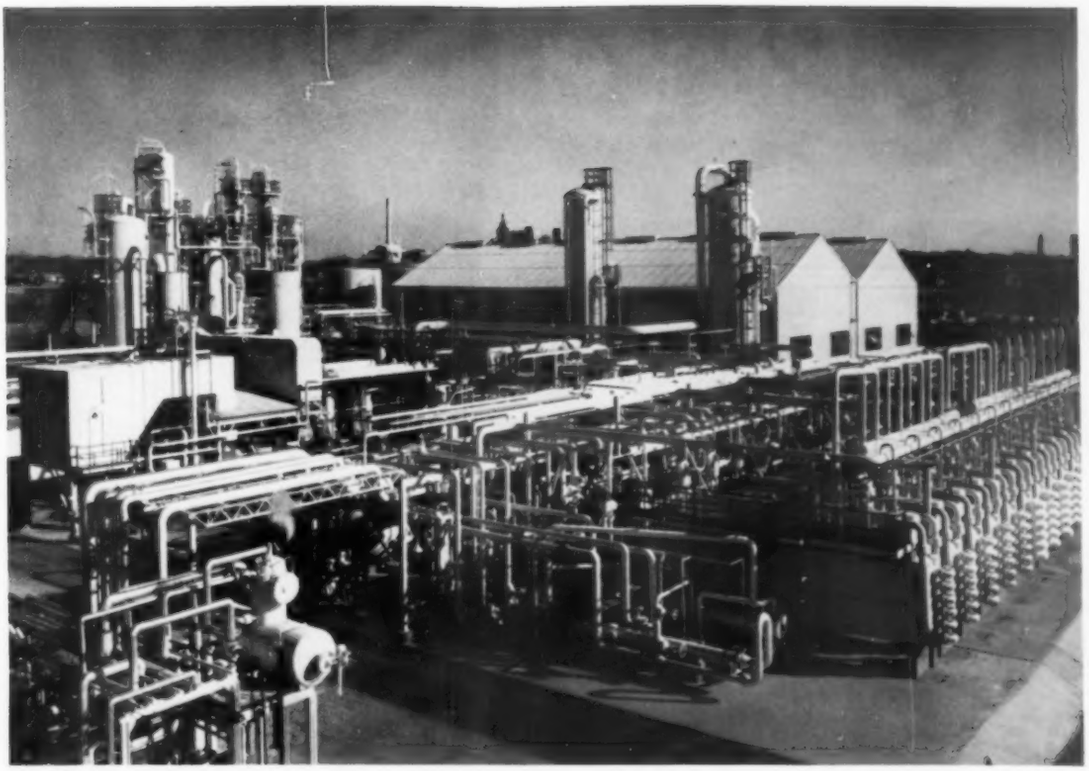

New "Black Art" plant for DX Sunray

This ultra-modern, high efficiency, dewaxing and wax fractionation unit was designed and constructed by Foster Wheeler at DX Sunray Oil Company's Tulsa, Oklahoma, refinery. It produces approximately 5800 bbl day of lubricating oils and 137 tons day of paraffin and microcrystalline waxes with an oil content of less than 0.2%. Ten different feeds are processed by blocked operation, ranging from 65 vis 100 F spindle distillate to Bright Stock and petrolatum.

The new unit's compactness, accessibility, versatility, and its instrumentation and control show direct application of Foster Wheeler's long engineering and process experience with the so-called "black art" of dewaxing and wax fractionation. The entire installation is tightly planned into a 230 ft by 308 ft area. Wax and oil are separated by selective solvency, using a blend of methyl-ethyl-ketone and toluol as the solvent. The solvent is also used in wax fractionation. Automatic flow controllers regulate solvent-to-feed ratios and other critical volumes.

The installation's gas turbine is the first used as a prime mover in the dewaxing process. An FW waste heat boiler utilizes turbine exhaust gases to produce all process steam. The propane and flue gas compressors operate on a single turbine shaft without gear reduction.

This plant is another example of Foster Wheeler's ability to serve you . . . to build your plant . . . any process . . . any size . . . anywhere. Foster Wheeler Corporation, 666 Fifth Avenue, New York 19, New York.

Heat Engineered products, plants and processes . . . for the world's industrial progress.

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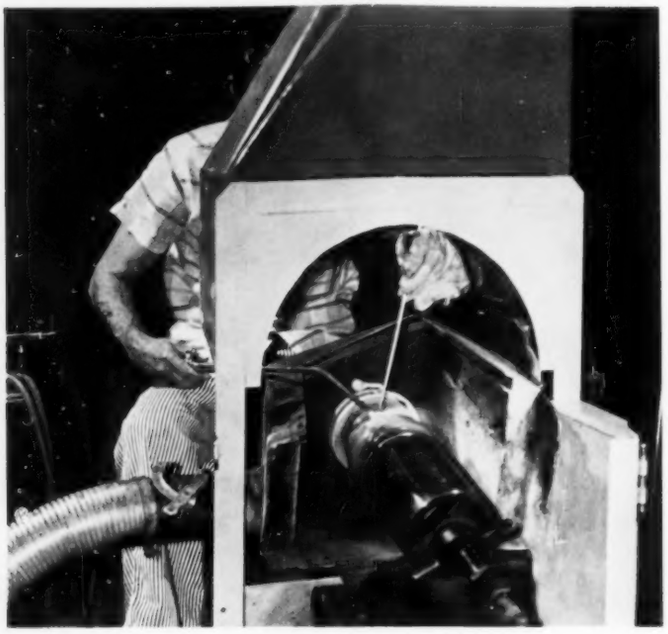

Oxy-Acetylene

Long-lasting and dependable protection of tool joints against abrasive wear is assured through the use of *Hughesite*—many times harder than hardened steel. Today, Hughes offers a choice of two superior methods of applying *Hughesite:* the new "HughesArc" application or Oxy-Acetylene.

In the improved Oxy-Acetylene application—developed by Hughes—wear-resistant *Hughesite* particles are distributed evenly throughout the hardfaced area. This assures maximum protection of the tool joints under severe abrasive conditions.

In the Oxy-Acetylene hardfacing method, *Hughesite* is applied in circumferential, interrupted grooves, using a special alloy steel binder to bond the hardfacing to the tool joint metal. On tapered tool joints, fingers of hardfacing are extended through the circumferential lands and down the elevator shoulder to provide extra protection in these critical wear areas. On square shouldered joints, half moon pads of hardfacing, applied by a newly patented method, prevent undercutting of the shoulder.

Oxy-Acetylene hardfacing is available on both "Flash-Weld" and "Seal-Grip" tool joints.

HUGHESITE...

hardest known hardfacing material

Oxy-Acetylene and *HughesArc* hardfacing get their superior wear resistance from the *quality* of the hardfacing material used—Hughesite—made by Hughes to specifications developed by Hughes. It is the most wear-resistant material that can be successfully used to hardface tool joints. Its quality is guarded by close manufacturing controls. First developed to hardface rock bit teeth, Hughesite has been used for the past 20 years to hardface Hughes tool joints. This extensive experience in processing and applying Hughesite is another reason why Hughes hardfaced joints today withstand the shock and abrasion of rotary drilling.

...offered in alternate applications

HUGHESARC

HughesArc uses the new consumable electrode method. In this method, Hughesite—hardest known man-made facing material—is fed automatically into the molten weld puddle just before it solidifies to obtain a uniform distribution of the Hughesite particles.

Special steel binder, more wear resistant than the tool joint itself, is used to bond the Hughesite particles to the tool joint metal.

HughesArc hardfacing—now available on all Hughes "Flash-Weld" joints—has been thoroughly field-proved. Over a period of years thousands of HughesArc hardfaced tool joints, divided among a large number of experimental groups, have been run in California, Canada and the Gulf Coast under continuous field observation. During the past year, many HughesArc drill strings have been placed in service in these same areas.

HughesArc hardfacing is being offered in the density and coverage best suited to the abrasiveness of the formations in which the drill strings are to be used.

HughesArc is offered in both flush and oversized (raised) applications.

On all tapered tool joints, fingers of hardfacing are extended down the elevator shoulder to provide maximum protection for this critical wear area. On square-shouldered joints, a newly patented method of applying hard pads to the shoulder is being used to prevent undercutting.

HUGHES®

Your Hughes representative can recommend the type of hardfacing that will provide the most economical protection for the service in which your drill string is likely to be used.

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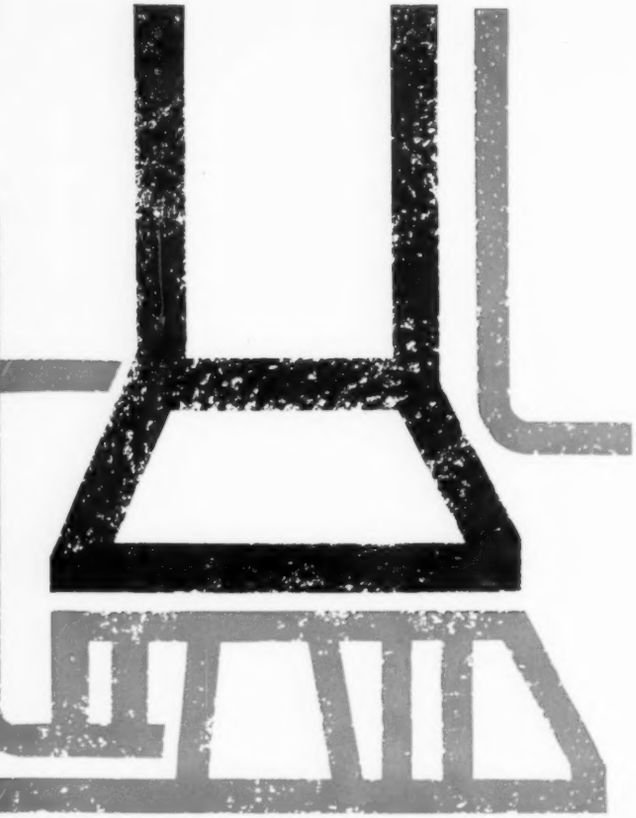
Procon completes African refinery 4 months ahead of schedule

Sixteen months to build a refinery in Mozambique . . . on the east coast of Africa near the port of Lourenco Marques . . . at considerable distances from the industries where almost all the refinery equipment had been constructed.

But build it Procon did! Not in 16 months—but in 12 months. Four months ahead of schedule! A modern 12,000 BSD refinery, it includes Platforming®, Unifining®, Merox™, and crude distillation units plus complete supporting facilities.

On stream for Sociedade Nacional de Refinacao de Petroleos (SONAREP) a subsidiary of the Portuguese petroleum marketing firm, Sociedade Nacional de Petroleos (SONAP), this refinery is another tribute to Procon's proven capabilities . . . to tackle the toughest job . . . and complete it in the shortest possible time.



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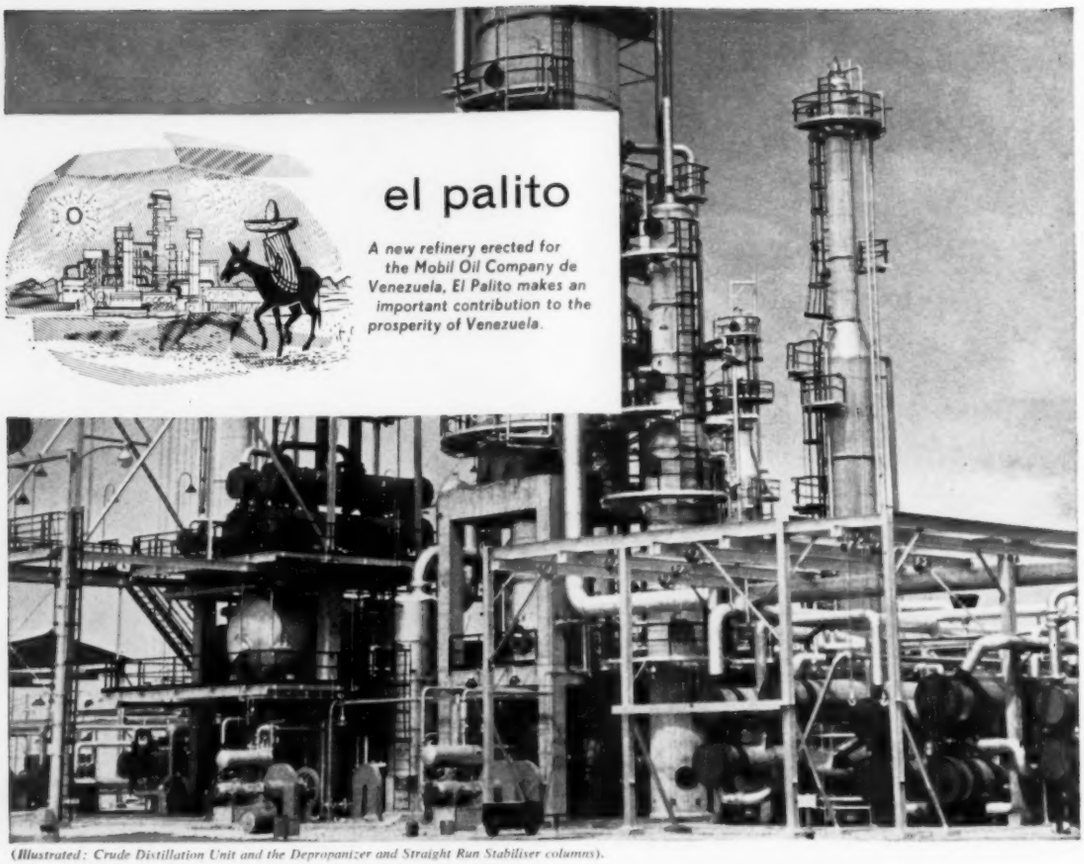

el palito

A new refinery erected for the Mobil Oil Company de Venezuela, El Palito makes an important contribution to the prosperity of Venezuela.

(Illustrated: Crude Distillation Unit and the Depropanizer and Straight Run Stabiliser columns).

insulation assignment at El Palito

A growing number of refinery insulation engineers are turning to NEWALLS (Regd. Brand) NEWTHERM Calcium Silicate Insulation—the insulation with qualities of particular significance in this field. Strong, yet of very light weight—moisture resistant and easily applied, NEWTHERM was specified for much of the more important process plant at El Palito.

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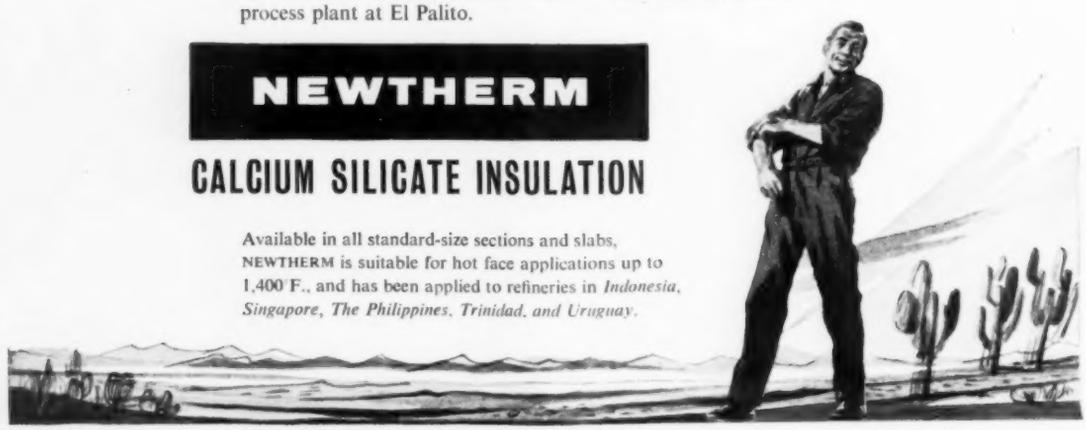

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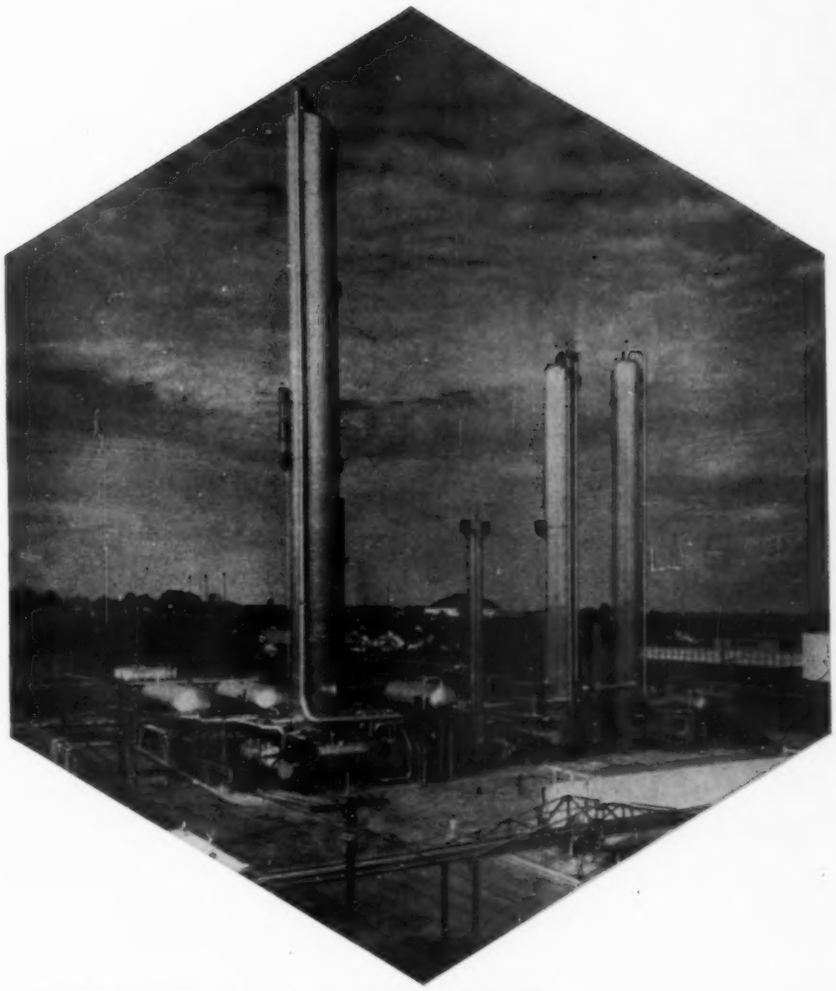

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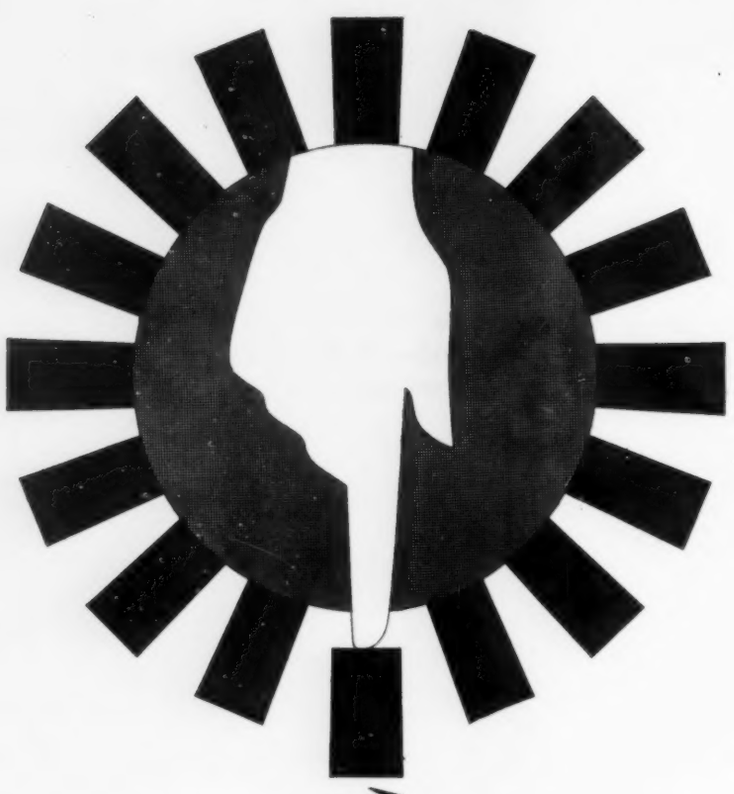

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B-W

by William C. Uhl
Processing Editor

Highlights of the month—closed-loop, fully automatic control system installed on 140,000 b/d crude still. Continued growth of plastics use in automobiles will require more research and development by petrochemical industry

The final step in fully automatic process control is now in operation on a 140,000 b/d crude distillation unit at the Whiting, Ind., refinery of American Oil Co. The installation of this first "closed loop" system developed by International Business Machines Corp. went through evaluation tests and a program checkout late in July.

The still has been tied through a process monitoring system to an IBM 704 computer at Amoco's technical computing center a mile from the refinery for the past year. This monitoring system was fully described in WORLD PETROLEUM, December, 1960, pp. 68-75 ("Electronic Computer Monitors World's Largest Crude Still").

With the new system, the crude unit is now under continuous computer control, around the clock seven days a week, instead of periodic guidance with the 704, which was time-shared for other problems.

An integrated operation for scanning process instruments, computing immediate as well as optimum operating conditions; the new system will continuously adjust process instruments in closed loop control so as to maintain optimum operations as process conditions vary.

It is built around an IBM 1620, solid-state, digital computer coupled to a large random access memory storage, and an input/output system to link the crude unit instruments and the computer.

The still operator works at a small console which enables him to obtain—by pressing the proper buttons—information about process conditions, and to insert information into the computer, such as product specification changes or the latest laboratory results. This is accomplished by manipulating sense switches and entering the information into a keyboard.

A typewriter on the console, and a separate logging typewriter, supply operators with the required information from the computer. The system can scan 250 instruments and reset up to 24 control instruments in closed loop operation.

The Whiting crude still installation is part of a three-phase computer control program being carried on by Amoco and IBM. A second installation at the refinery will be on an Ultraformer. The monitoring system which had been on the crude still is now being put into the Ultraformer.

At present, the system is planned only for the one unit, but Amoco pointed out that the presence of two similar Ultraformers in the immediate area can make possible the ultimate time sharing of a centralized computer system for multiple unit control.

The third phase of the program will be a feasability study of an on-line, real-time guidance system for Amoco's 145,000 b/d Texas City refinery. This would regularly scan the most significant instruments on each process unit at the refinery as well as the storage tank inventories. From these data and current refinery economic and product demand information, the computer would then coordinate day-by-day operations to insure the best over-all refinery product yields at the lowest possible cost.

Meanwhile, three other closed loop systems have already been operating in the industry for some time, although little has yet been reported on performance.

Monsanto Chemical Co. installed full, on-line computer control at its Barton ammonia plant, Luling, La., about the first of 1960, using a Thompson-Ramo-Wooldridge RW-300 digital computer. Texaco put in the same type of instrument at Port Arthur, Texas, back in March, 1959, placing an 1,800 b/d polymerization unit under automatic closed loop control; and B. F. Goodrich Chemical Co. installed an RW-300 on a vinyl chloride unit at Calvert City, Ky., in March of 1960.

The Texaco facility was the first time a computer took over the control of an industrial process. By comparison with Amoco's new unit, it is a relatively simple system, gathering data from 110 sources and controlling 16 flows, temperatures, and/or pressures.

More recently, Allied Chemical Corp. announced plans to install an RW-300 on its South Point, Ohio, ammonia plant. Sensing data from more than 300 sources, it will perform optimization routines and reset the operating points for over 60 variables.

With computer installations costing upwards of $200,000 to $300,000 it's a safe bet that the payout has to be good on the facilities covered so far as well as those planned for the future.

Considerable growth in the use of plastics in automobiles is being predicted, even though the rise thus far has already been spectacular. For the long term future, however, applications may become more limited unless new plastics are developed with properties making them useful as true structural materials.

These forecasts were made in recent talks by Ford Motor Co.'s T. H. Risk and colleagues; at the summer meeting of the Society of Automotive Engineers, and a New York meeting of the Society of Plastics Industry.

Automotive use of plastics has increased from approximately 4 lb per "average" car in 1940, to 25 lb/car today, and will rise to about 45 lb/car by 1965, Risk said.

On the basis of the current annual output of some 5.5 million cars, the 1961 market for plastics could reach some 137.5 million lb, and the 1965 market around 300 million lb. In 1940, there were 11 types of plastic materials in general automotive use. By 1950, the number had grown to 16; today it is 22.

There are now about 170 plastic parts in each car. Approximately 30% of the total plastics now used are for functional parts—speedometer gears, window regulator rolls, water pump bearings, switch bodies, carburetor spacers, distributor covers, and the like. The remaining 70% is for trim and decoration.

Among specific materials now in fairly wide use, Risk cited the following: nylon, acetal, polycarbonate, methacrylate, polyethylene, polypropylene, and ABS (acrylonitrile, butadiene, and styrene terpolymers and blends).

Price reduction is regarded by the Ford technologists as a big factor in the increased automotive use of plastics during the past decade. On a weight and volume basis, the average plastic (computed by Risk on the basis of nylon, methacrylate, ABS, polyethylene and polypropylene) dropped 34.5% between 1954 and 1960, while steel increased 20%.

The metals are, of course, still less costly on a weight basis alone. However, plastics are expected to continue downward in price, while steel and aluminum are more likely to increase.

Looking forward toward still further use of plastics for additional automotive components, Risk warned that a new approach must be taken, to provide plastics with greatly improved physical and mechanical properties. For example, heat resistance is an important consideration since vehicle components are exposed to temperatures varying from —40 to 250 F.

Another problem is the difference in coefficient of expansion where plastic must be mated with steel. The expansion value of the plastic may sometimes be 10 times greater than that of steel, and this presents serious joining problems, particularly in large sections where rigid connection is essential for structural loading.

Among other properties in which plastics as a group must be improved are impact resistance and flexural properties at low temperatures.

It is evident that if even a good share of this rapidly growing market is to be obtained by plastics manufacturers, the petrochemical industry has its work cut out.

What's New in Processing Plants

Expansion underway—at BP Benzin and Petroleum's Hamburg, Germany, refinery, from present 1.95 million ton/yr to 2.3 million; completion early 1962.

• • •

Under consideration—a site near Capetown, South Africa, by Caltex for its projected $33 million refinery. Offshore unloading facilities would be established near Milnertown.

• • •

Contract awarded—to Foster Wheeler Corp. to design and engineer a 140,000 ton/yr lubricants plant at Kurnell, Australia, for Australian Lubricating Oil Refinery Ltd. (Caltex, Sleigh Pty Ltd. and Ampol), to include a 6,000 b/d distillation unit, furfural solvent extraction, hydrofinishing, and MEK-toluol dewaxing.

• • •

Three proposals submitted—for an $8 to $9 million refinery near Dar es Salaam, Tanganyika, by Stanvac (East Africa); Caltex (Africa) Ltd.; and AGIP, part of Italian state company ENI.

• • •

Construction scheduled—to start early in 1962, for expanding Duisburg, Germany, refinery of Purfina to 30,000 b/d. Project was planned originally for this year.

• • •

Name changed—to Golden Eagle Refining of Panama, from Panama Refining & Petrochemical.

• • •

Planned—a refinery on a 200-acre site, location undisclosed, in Liberia, by Hunt International Petroleum Corp. (of Dallas, Texas), under terms of recently signed agreement with the government under which Liberia will receive 50% of all profits and the concession will run 25 years with a renewal option for a similar period.

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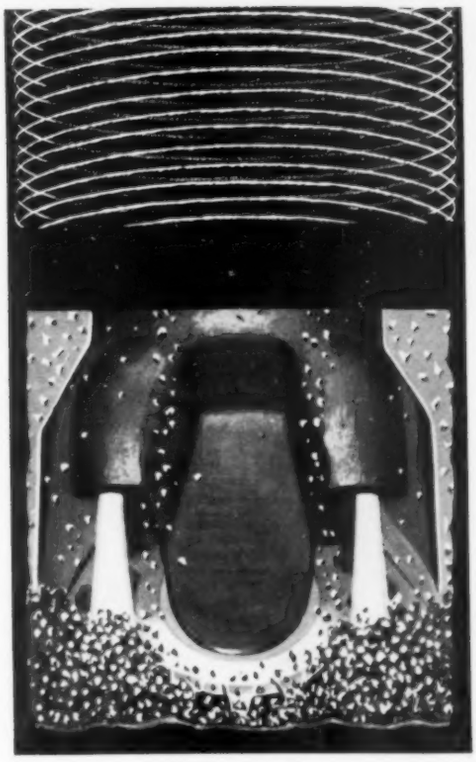
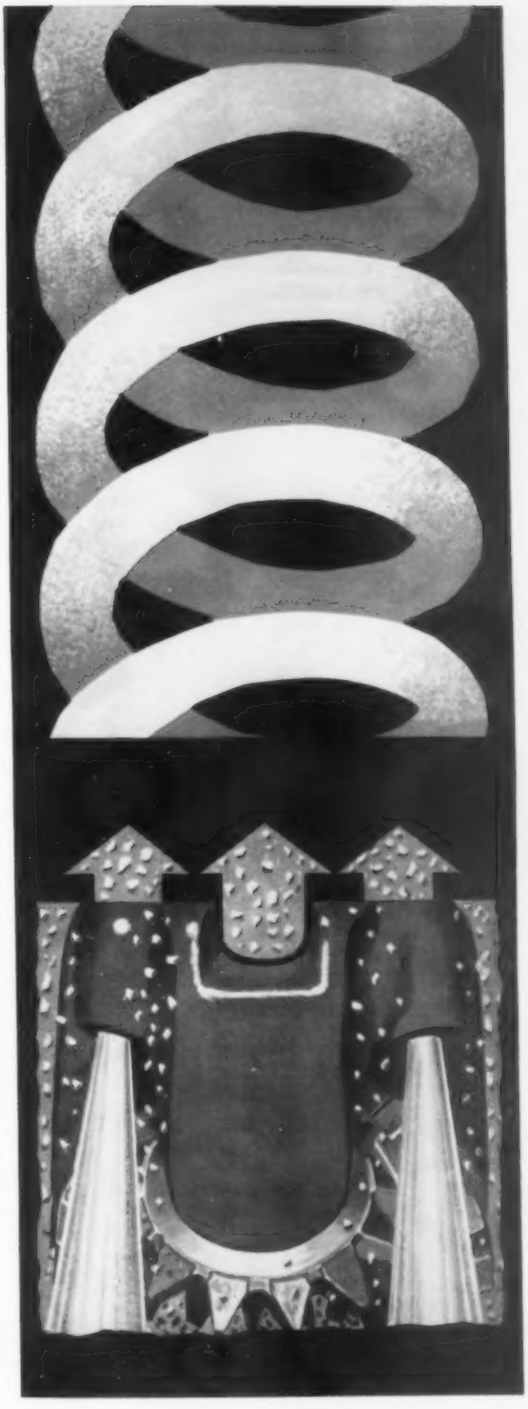
Company established—by Ohio Oil to build and operate its planned 24,000 b/d refinery in northwest

(*Continued on page* 32)



milling or drilling?



How can you tell if you're milling or drilling? It's easy. If you are using Reed Flush-Flo jet bits you **know** you're drilling ahead. Here's why—

1—The Flush-Flo ports allow an alternate route around the high velocity jets. Laboratory tests prove the Flush-Flo design allows the drilling fluid to sweep the entire bottom of the hole, whereas other jet type bits develop little fluid movement at the center.

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4—The flow pattern of the Flush-Flo jet bit provides less turbulence at the bit and affords greater protection in very soft formations.

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(*Continued from page* 30)

Spain. Company name is Cia. Iberica Refinadora de Petroleos S.A.

• • •

Planned—by Arabian Oil Co., three refineries in Japan with a combined capacity of about 200,000 b/d, to be completed in 1963, 1964, and 1965.

Construction will start next spring on a 100,000 b/d refinery at Numazu, estimated to cost 15 billion yen, by a refining company to be established by Arabian Oil, Tokyo Electric Power, Showa Denko, and Sumitomo Chemical.

Two 30,000 b/d units are to be built later at Nagoya, on reclaimed land, mainly to furnish fuel oil to Chubu Electric Power. Mitsui Bussan is a backer.

Plans are not yet settled for third project, expected to be a 100,000 b/d refinery at Osaka, as a part of an electric power and petrochemicals center.

• • •

Operations discontinued—by Continental Oil at its 42-year-old refinery at Wichita Falls, Texas. Area will be supplied from Ponca City refinery by a new $2.6 million products pipeline. Final decision has not yet been made as to disposition of the shutdown plant.

• • •

Completed—a 6,000 b/d Houdriformer unit at Nippon Mining Co., Mizushima, Japan. Engineering was handled by Houdry Process Corp. and Catalytic Construction Co. Erection was by the Nissho Co. Ltd. and Niigata Engineering Co. Ltd. of Tokyo.

• • •

Planned—a 2,950 b/d Lomax catalytic hydrocracking unit, by Apco Oil Corp. at Arkansas City, Kans., the second company to use the new Universal Oil Products Co. developed and licensed process.

• • •

Planned—a 1,425 b/d HF alkylation unit, by Pure Oil Co. at Heath, Ohio, with completion early 1962. Kaighin-Hughes-Litwin, Inc. of Toledo has contract.

• • •

Under construction—a $4.5 million, 2,000 to 3,000 b/d refinery at The Pas, Manitoba, Canada, by Canadian Kodiak Refineries, for completion late this year. Products will include premium and regular gasolines, jet fuel, diesel and fuel oil, residuals and asphalt.

What's New in Petrochemicals

Contract awarded—by Mobil Chimica Italiana, to Cia. Tecnica Industrie Petroli of Rome, for construction of Mobil's petrochemical plant near Naples, Italy, to be completed early in 1963 with an initial capacity of 130,000 ton/yr of benzene, ethylbenzene, orthoxylene, and paraxylene.

• • •

"Substantial minority interest acquired—by Amoco Chemicals in Furukawa Chemical Industries of Tokyo, Japan, maker of polyethylene and co-polymers under license from Indiana Standard.

• • •

Planned—a 29,000 ton/yr dehydrogenation unit, by Petrobras at its synthetic rubber complex now under construction at Duque de Caxias, Brazil. Under license by Houdry-Brazilian Co., new unit will be able to produce butadiene from n-butane or mixtures of butane and butenes.

• • •

Contract signed—by which Procindus Ltd., a wholly-owned subsidiary of Courtaulds Ltd. of UK, will furnish know-how and supply plant to Polimex of Warsaw, to manufacture acrylic fiber at Lodz, Poland. Construction is to start in 1963. Cost is about $5.6 million.

• • •

Planned—a $300,000 synthetic detergents plant near Tripoli, Libya, by Soc. Industriale Libica, which has signed agreement with Lurgi of Frankfurt to build and provide initial operation. Completion summer of 1962.

• • •

Planned—a new dimethyl terephthalate plant at Delft, Netherlands, by 1963, by N. V. Petrochemie AKU Amoco, a new company formed by Amoco International S.A. and Algemeine Kunstzijde Unie N.V.

• • •

Under construction—doubling of capacity of an acetone plant (to 4,400 ton/yr) near Bucharest, Romania, using a new Hungarian partial oxidation process which operates on acetylene from methane.

Expansion planned—in petrochemicals, by British American Oil Co. Ltd. B-A is acquiring a 25% interest in Shawinigan Chemicals Ltd. and will supply feedstocks to Shawinigan's new petrochemical plant to be built at Varennes, Quebec. B-A is transferring to Shawinigan, along with a related financial adjustment, its 50% interest in B.A.-Shawinigan in return for its 25% interest in the much larger operation.

• • •

Planned—a $1 million, 60 million lb/yr methyl chloride plant at Lake Charles, La., by Ancon Chemical Corp., newly formed, jointly owned subsidiary of Ansul Chemical Co. and Continental Oil Co. Blaw-Knox Co. has the contract, and completion is planned for early 1962.

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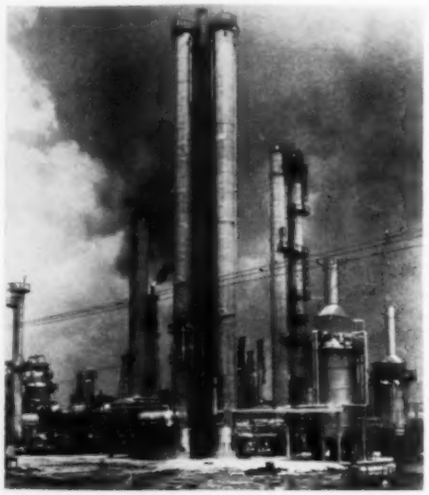

Tenneco Oil's Badger-built Udex and ethylbenzene plants at Chalmette, La.

Completed—two new units at Tenneco Oil Co.'s Chalmette, La., refinery, putting this subsidiary of Tennessee Gas Transmission Co. into the petrochemical field. The plants, handled by Badger Mfg. Co., include a 2,200 b/sd Udex extraction unit and BTX separation facilities, and a 20 million lb/yr ethylbenzene plant.

• • •

Location announced—for petrochemical complex to be built by Dow-Unquinesa S.A. To be at Somorrostro, Viscaya, near Bilbao, Spain, the plant will have the following production capacities, in ton/yr: high pressure polyethylene, 10,000; low pressure polyethylene, 6,000; styrene, 12,000; and polypropylene, 8,000.

• • •

Completion announced—of AviSun Corp.'s new 100 million lb/yr polypropylene plant at New Castle, Del., making AviSun the largest polypropylene producer in the world.

• • •

Ownership increased—by Hooker Chemical Corp., in the new Argentine phenol and monochlorobenzene producer, Duranor, bringing Hooker's interests to 50%. An equivalent investment will be held by the Argentine firm, Atanor, of Buenos Aires. Duranor is building its new facility at Rio Tercero, Cordoba province, 450 miles northwest of Buenos Aires, and adjacent to an existing Atanor plant. Fish International Corp. has the engineering and construction contract. Capacities will be 9,120 ton/yr phenol, plus 1,200 ton/yr monochlorobenzene for sale over and above Duranor's needs.

• • •

Planned—a 400 million lb/yr ethylene plant on Cedar Bayou, near Mont Belvieu, Texas, by Gulf Oil Corp., completion expected mid-1963. Other units planned later include a high purity propylene plant.

• • •

Planned—doubling of present nitrogen capacity (14,600 ton/yr) at Flixborough, England, by Fisons, Ltd., including new ammonia unit, gas reformer, etc. Completion early 1962.

• • •

Contract awarded—to Lummus Co. and Firestone Tire & Rubber Co., to build a 28,000 ton/yr polybutadiene plant near Recife, Brazil, sponsored by a government agency.

Planned—a $24 million plant in Taiwan, to make 106,000 ton/yr ammonia and 100,000 ton/yr urea. A proposal has been made to the Republic of China by Mobil Chemical Co. and two associates, Allied Chemical Corp. and Chinese Petroleum Corp. (35% Mobil and 30-30 each for the others).

• • •

Planned—a $20 million, 63,000 ton/yr ammonia-methanol plant at Botany, Sydney, Australia, by ICIANZ (Imperial Chemical Industries of Australia and New Zealand Ltd.).

• • •

Completed—two Canadian plants of Dow Chemical Co. Ltd.: the Ladner, B. C., phenol unit; and the glycols, ethanolamines, pentachlorophenol unit at Fort Saskatchewan, Alberta.

• • •

Completed—a 1,000 b/d hydrodealkylation unit by DX Sunray, at Tulsa, Okla. Present production is 800 b/d benzene from toluene.

• • •

Completed—$5 million, 50 million lb/yr furnace black plant at Port Jerome, France, by United Carbon France, S.A., operating on fuel oil as feed.

• • •

Planned—expansion of phthalic anhydride capacity to 2,880 ton/yr, at Ftalicos, Brazil, by Industria Quimica S.A., Brazilian subsidiary of W. R. Grace & Co. Also, Grace plans a 720 ton/yr phthalic anhydride plant at Bogota, Colombia.

• • •

Approval sought—from Japanese government, by Idemitsu Kosan Oil Co., to build a $36 million, 100,000 ton/yr ethylene plant at Tokuyama, Japan, with completion in 1962.

• • •

Planned—$8.4 million, 50,000 ton/yr ammonia plant at Nord-Rana, Norway, by Norsk Koksverk, a government firm, for completion in 1963.

• • •

Under construction—aromatics extraction unit (Udex), at Gelsenkirchen-Horst, Germany, by Gelsenberg Benzin A.G., with capacity of up to 47,000 ton/yr of benzene. Completion fall of 1961.

• • •

Under construction—a $5.6 million plant at Pernis, Netherlands, by Shell Chemical, to produce commercial quantities of a newly developed line of organic acids, trade-named "Versatic," with properties making them applicable to surface coatings (as driers), plastics, rubber, and other industries. The acids presently available are a blend of C_9, C_{10} and C_{11} mono carboxylic acids.

Better Refinery Waste Separation

An improved gravity type separator for refinery effluent, designed by engineers of Royal Dutch/Shell group, gives about 40% reduction in the oil content of the effluent compared with the conventional type of gravity separator.

The improvement is effected by incorporating parallel plates in the separator, which function as collecting surfaces for the oil globules in the effluent. The plates are tilted to guide the movement of the oil towards the surface and the sludge towards the bottom.

Conventional gravity separators are designed to remove all free oil globules larger than 150 microns in diameter. Smaller globules, or those loaded with heavy solids, may pass through and result in a relatively high oil content in the effluent under adverse conditions.

Parallel plates have been installed in a number of Shell group refineries. In one example, the conventional separator had removed 84% of the globules in the range of 120-150 microns, plus an appreciable amount of the smaller sizes. The parallel plate separator, on the other hand, is removing all globules larger than 90; 93% of those between 60 and 90; and 80% of those in the 30-60 micron range.

Fluor Corp. in New York

The Fluor Corp. Ltd. has changed the name and location of its New York engineering subsidiary. The new name is Fluor-Singmaster & Breyer, Inc. Incorporated originally in 1929 as Singmaster & Breyer, Inc., the firm affiliated with Fluor in 1914.

The offices have been moved from the Graybar Bldg. (420 Lexington Avenue) to quarters at 100 Park Ave. President of F-S & B is Byron Marquis.

The eastern area sales office of Fluor remains at 589 Fifth Avenue, where L. R. Lyon is sales manager.

PROOF OF PERFORMANCE at a major gulf coast refinery.

Nothing says customer satisfaction as strongly as a re-order. Since Chiksan sold its first Hydraulic Marine Loading System in 1955, many original customers have re-ordered. They have learned through actual operation that this is the safest, most efficient, most practical method of modern tanker loading. The Chiksan system shown went into service in September, 1959; additional units have since been ordered. For a quotation on a system for your terminal, write Chiksan, Brea, California.

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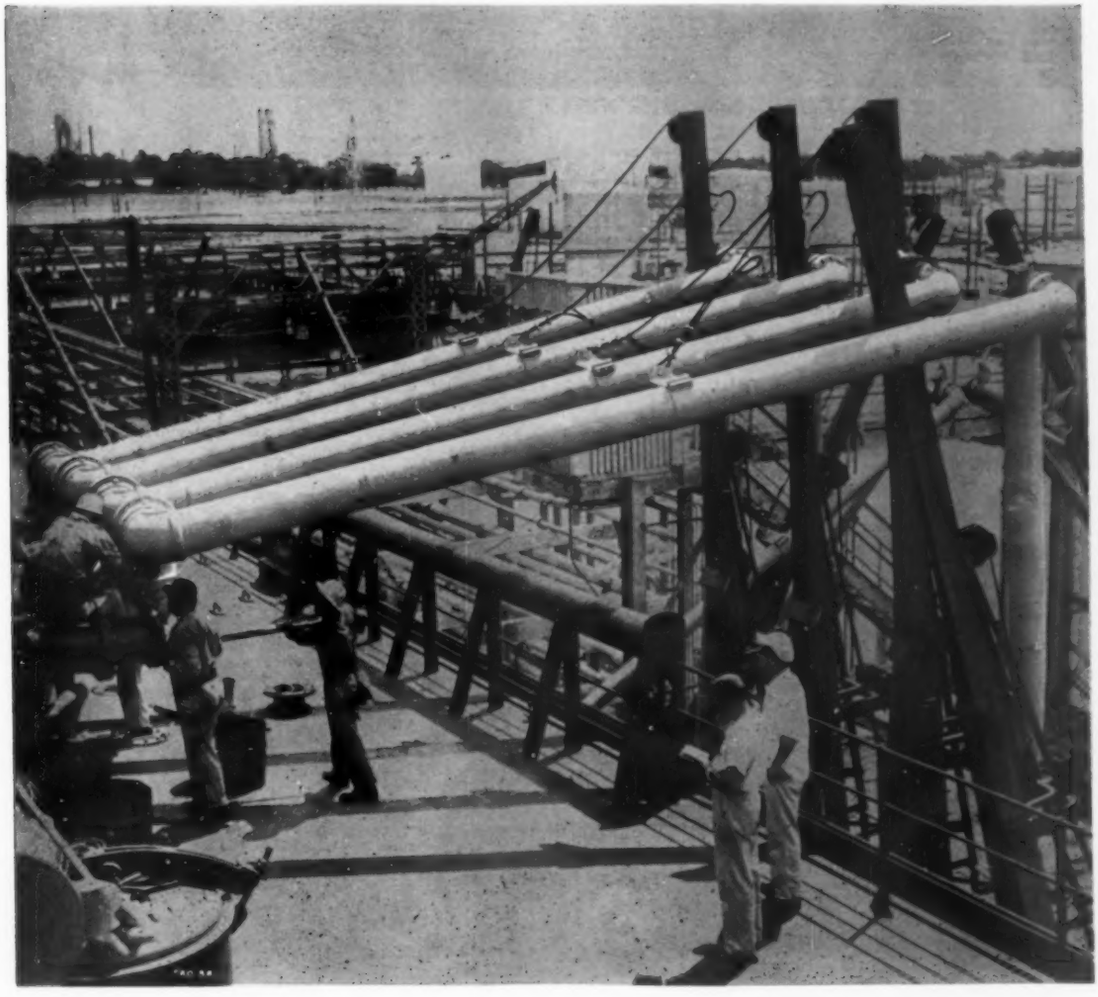

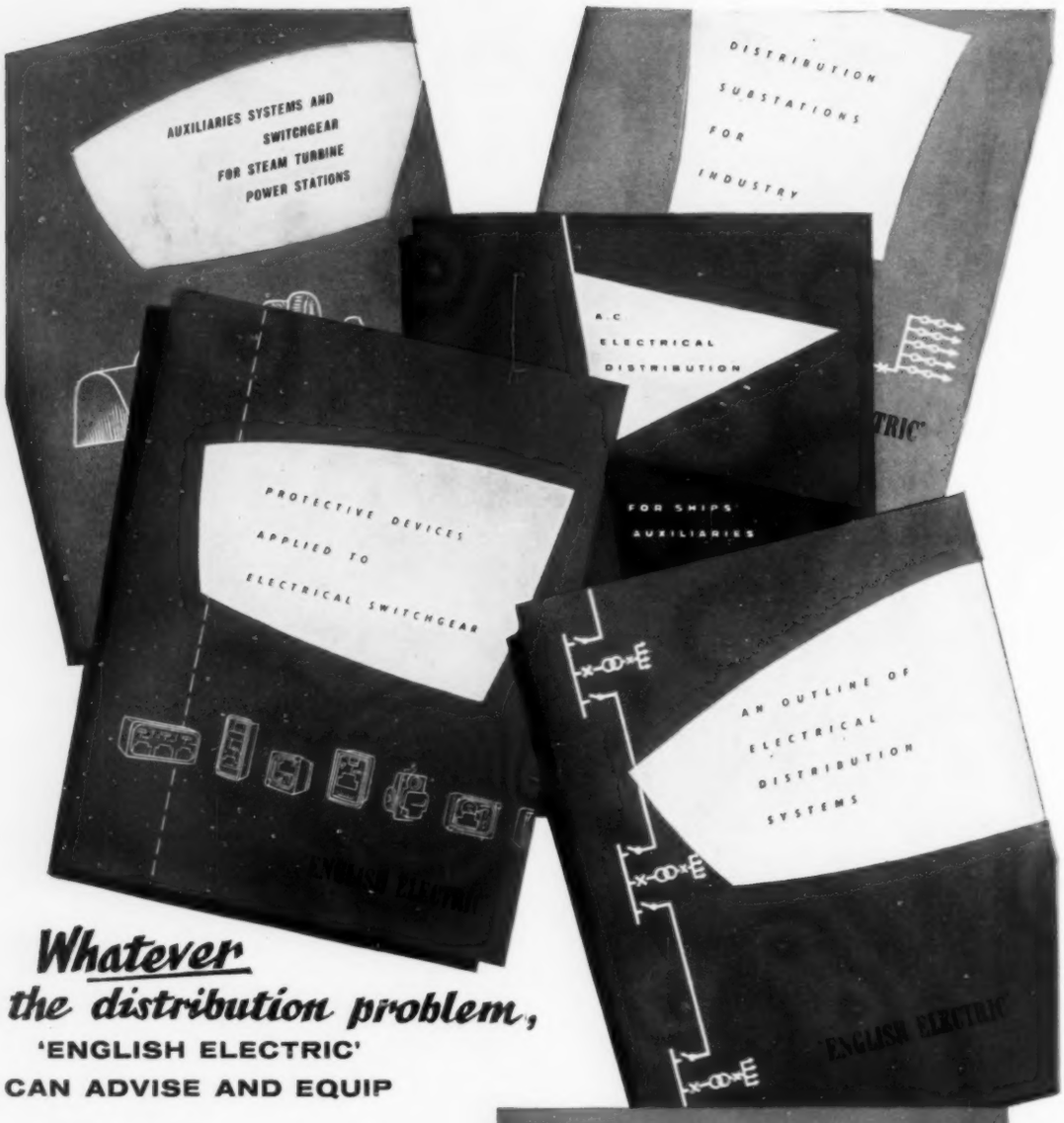
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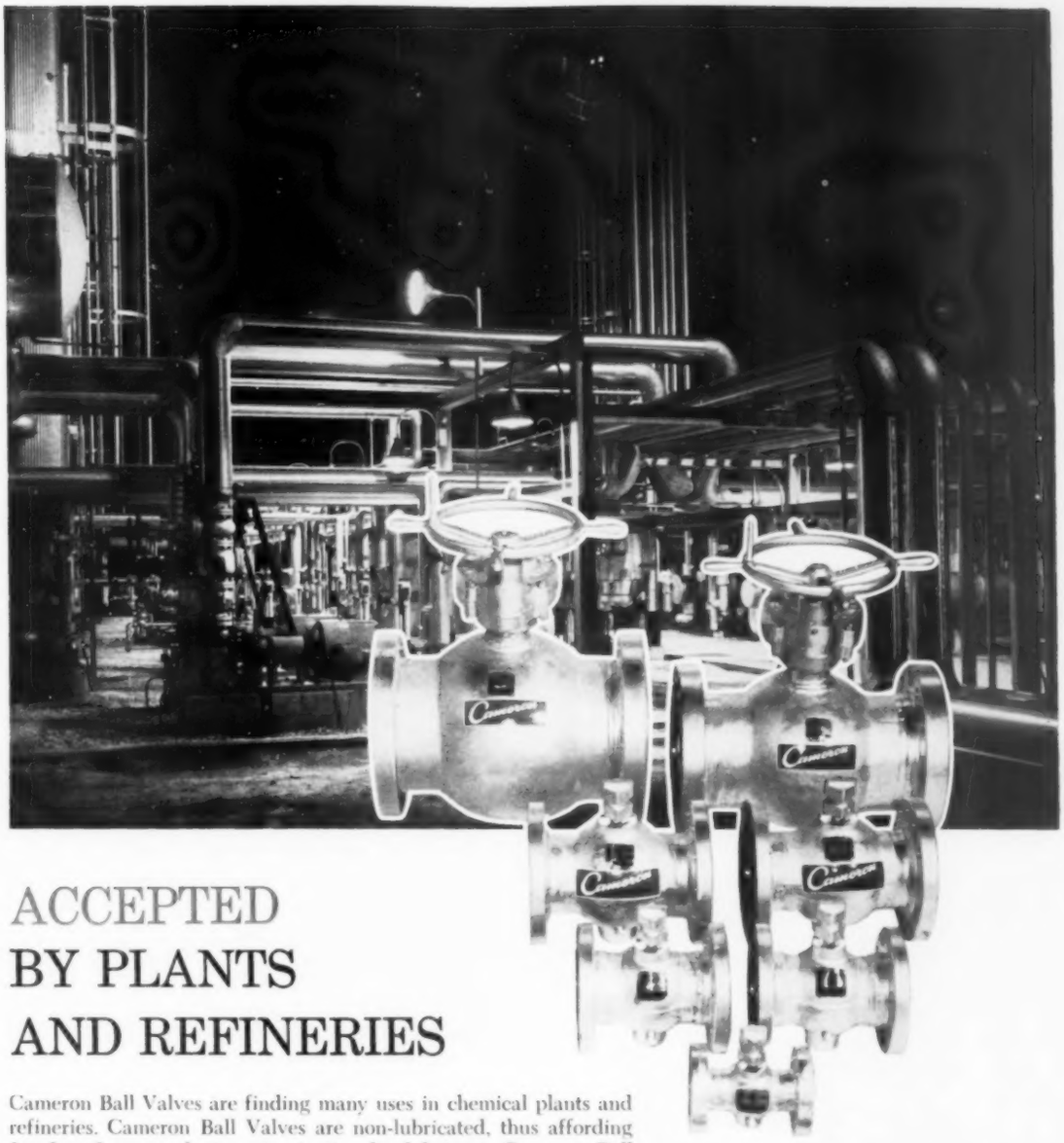

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Cameron Ball Valves are finding many uses in chemical plants and refineries. Cameron Ball Valves are non-lubricated, thus affording freedom from product contamination by lubricant. Cameron Ball Valves have no bonnets or glands to leak. They have bubble-tight shut-off without adjustment and require no maintenance. These features are especially valuable at plants and refineries.

Cameron Ball Valves have been tested for three years in many types of service. The large volume of repeat orders attests to their savings for customers and their outstanding performance. They are compact, amazingly easy to operate and can be equipped with wrench, hand-wheel or power operators. Cameron Ball Valves are available in sizes 2" and larger, 150# ASA to 1500# ASA.

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CAMERON BALL VALVES

A NEW CONCEPT IN DRILLING EQUIPMENT DESIGN

GARDNER-DENVER MAKES THE NEWS

Important changes are now in progress in the drilling industry. As holes have become deeper and costs per foot drilled have continued to rise, operators have become aware of the advantage in using equipment that has been engineered to work together as a balanced team for maximum speed and efficiency. It is only natural that the ultimate in operating economy and efficiency can be achieved when there is a single source for engineering, fabrication and service of this equipment.

Recognizing this need, Gardner-Denver, one of the largest manufacturers of mud pumps, air compressors and air drilling equipment, has now completed a full line of oil drilling equipment for every depth well from 4,000 to 30,000 feet.

Unique in the drilling equipment industry, Gardner-Denver equipment designs were not limited by existing equipment and tooling. Without fear of obsoleting existing stocks, Gardner-Denver engineers directed their efforts to producing the most advanced equipment that could be built . . . to developing new concepts of torque/speed combinations that would give more usable horsepower and lower maintenance costs.

Typical of these new Gardner-Denver drawworks designs is the Gardner-Denver 1100, a 1,100 horsepower drilling unit for depths to 15,000 feet. Similar in basic design to the larger Gardner-Denver 2100 and 1500 drawworks, the Gardner-Denver 1100 is built around a single package, side skidded drawworks. All controls, transmission, auxiliary brake and drawworks are mounted on the main skid. This integral arrangement offers many time saving advantages, including faster rig-up and moving, positive alignment of transmission and permanently mounted control panel.

Rugged Drawworks Construction

Heavy steel plate, doubled at bearing centers for extra rigidity, is used for the drawworks housing. A continuous ring of steel plate is welded around shaft openings to eliminate distortion of the side plates. This feature greatly increases bearing life. Engineering of sprockets, ratios and bearings has been unitized to produce a balanced torque/speed combination that lengthens chain and bearing life.

Short Shaft Transmission

Hi and lo main drum clutches give the driller a selection of eight hoisting speeds and a reverse. The transmission is ratioed in four speed increases. Equalization of the speed increases has produced a smooth progression over the entire range.

Short shafts and bearing centers are an outstanding point of the transmission design.

Tension Bar Equalized Brakes

Extra braking power through 330 degree wrap brakes make the Gardner-Denver 1100 an easy-to-handle rig that will stop the heaviest load with precision. A tension bar equalizes both brakes for a balanced pressure on the rims. A centralized lubrication panel supplies lubricant to all brake linkage.

The driller can control the water level within the hydromatic brake without leaving his station. An indicator gauge and control valve are mounted on the console.

Matching compounds for two and three engines in both stair-step and in-line arrangements are available for the Gardner-Denver 1100.

A brochure covering each drawworks and companion equipment is available on the full Gardner-Denver line. Stop in at your nearest supply store or write direct for your copy.

Gardner-Denver has great faith in the future of the petroleum industry and the men who have made it one of our nation's most important assets. This confidence is expressed by the recent expansion of its Petroleum Division to include the manufacture of a complete line of drilling equipment: drawworks, rotary tables, swivels and blocks. To assure you of the finest equipment, Gardner-Denver has invested in new tools, plants and obtained the services of the industry's outstanding engineers. All of us at Gardner-Denver are looking forward to serving you through our expanded Petroleum Equipment Division.

GARDNER-DENVER 1100 DRAWWORKS—A NEW CONCEPT IN DRILLING RIG DESIGN

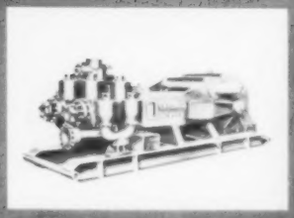
Unique in the oil field equipment industry, Gardner-Denver was able to build the 1100 drawworks without fear of obsolescence for older designs in the field. From the ground up, the 1100 drawworks is a unitized design with each part and detail selected to give a balanced drilling rig that will operate with maximum efficiency under longest and hardest drilling service. ☐ One of a full line of Gardner-Denver drawworks for drilling from 4,000 to 30,000 feet, the 1100 fits programs in the 8,000 to 15,000 foot range. Representative of the entire line, the 1100 design features a new concept of torque/speed combinations that give more usable horsepower and lower maintenance costs. Its short shaft and large bearing arrangement extends service life of these vital components. All controls, transmission and auxiliary brake are integrally mounted on the main skid for faster rigging-up and moving. GARDNER-DENVER

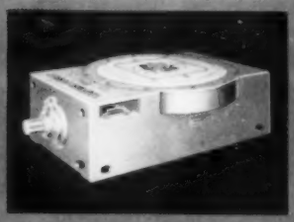
See next page

©1961 Gardner-Denver Company, Quincy, Illinois

Balanced/Engineered Drilling Team

Gardner-Denver drilling equipment has been designed as a matched team for greatest drilling efficiency. In addition to the drawworks and compound there is a swivel, block, rotary table, mud pump and compressor to match every drilling program.



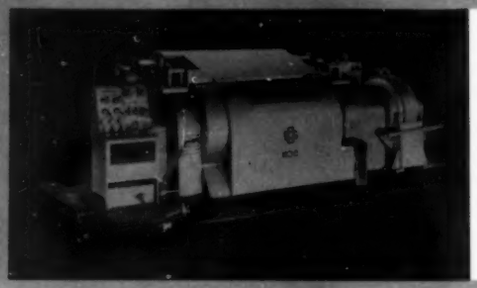


MUD PUMPS

Gardner-Denver mud pumps have earned one of the finest names in the drilling industry. Ruggedly built, they have double helical gears, counter balanced eccentrics and are fully pressure lubricated for long life of moving parts. Pumps are available in sizes to match the Gardner-Denver 1100 drawworks in rating and capacity.

22½ ROTARY TABLE

Only Gardner-Denver rotary tables have Turbo-lubrication to increase the life of working parts. Turbo-lubrication cools and lubricates every moving part with a fast-moving stream of oil. Picked up from the large reservoir by the pinion gear, oil is force-circulated by the ring gear — then centrifugal action speeds the oil flow and distributes it evenly over the gears and main bearing. This large volume of cool oil adds thousands of hours of maintenance-free service to Gardner-Denver rotary tables.



RIG-MATCHED EQUIPMENT
FROM CROWN BLOCKS TO PUMPS FOR THE

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GARDNER-DENVER DRAWWORKS

Write for the 1100 brochure today!

300-TON TRAVELING BLOCK

Fast, true fall characteristics have been engineered into the Gardner-Denver line of traveling blocks. Unhampered by old designs or tooling, a new ratio of weight to rated capacity has been achieved. For faster falling, up to 2,000 pounds of weight has been added over competitive designs without increasing outside dimensions. For smooth operation, fabricated sheaves with perfect balance . . . both dynamically and statically . . . are used. Matching crown blocks available.

Gardner-Denver equipment combines imaginative engineering and modern technology with a century of experience.

300-TON SWIVEL

This new line of swivels is rated in "depth range" rather than in older terms of tonnage. This realistic concept is based upon actual field practice where depth, drilling load and speed are usually found consistent over a given drilling range.

Features: High pressure, easy change packing. Low center of gravity. High capacity bearings. Turbo-lubrication. Streamlined steel body for safety and strength.

GARDNER-DENVER

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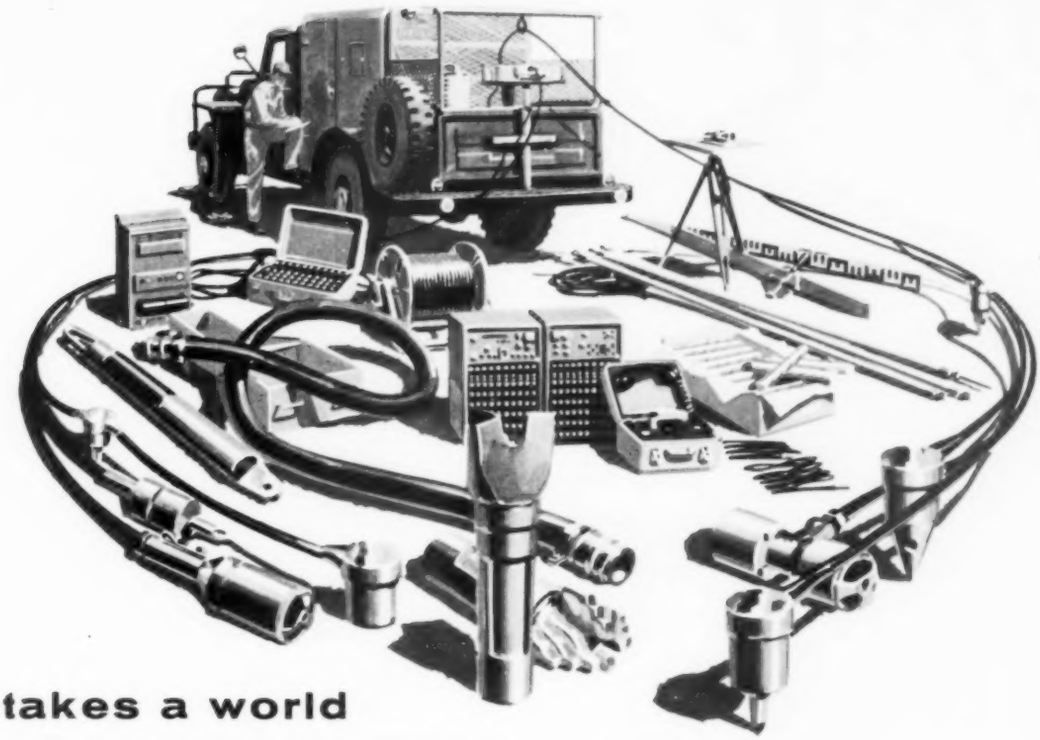

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It has been the foundation for providing only fully experienced personnel familiar with local needs.

As a result, regardless of location throughout the Free World, you will find Halliburton service "just minutes away from your well."

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The power to tax

Recent proposals by the Administration of President Kennedy seek to change taxation rules for companies operating abroad. The international petroleum industry, largest U. S. investment abroad and one of the world's largest industries, has a great stake in these proposals. Any change would certainly have great repercussions for the oil industry and would greatly affect the U. S. position vis-a-vis the rest of the world. Faced as we are with competition between the U. S. and the USSR, any changes should be carefully weighed to be certain they will not injure the ability of U. S. companies to compete in the world oil struggle for markets.

The original statements of Secretary Dillon regarding the Administration's proposals appear to be based on the supposition that subsidiaries abroad are devices to escape tax. This is not true. If it were it would be one of the few examples of all time wherein the mousetrap was perfected before the mouse, since the use of subsidiaries in other countries is a very old device. Needless to say, it goes back long before the income tax ever existed.

One of the Administration's proposal's would tax currently the undistributed income of controlled corporations abroad. Another would change the method of commuting credit for foreign income taxes paid abroad with respect to earnings of corporations abroad distributed as dividends. The first of these is considered by the Administration as a tax on a "deferral privilege" which is "no longer desirable under present conditions." The question is much deeper than that, however. No country imposes an income tax on the earnings abroad of subsidiaries owned by their nationals. Thus this proposal would be unique and as such a backward step in the efforts toward income tax conformity which have been under way for many years.

Even more important would be the effects on international oil operations. The world is in a period of crude surplus that seems likely to last for some time. In this period the ability of an oil company to market its oil is of primary and paramount importance. If the taxation proposals removed oil company subsidiaries from Europe, for example, or severely curtailed their expansion there to keep up with European demand, to where would the oil from underdeveloped countries of the world flow? At present it is the chains of service stations abroad which handle this oil. Without them the oil would not flow, and if they were taken over by other companies the competitive position of American companies would suffer greatly.

In any case, the Administration's proposals seem to be based on the assumption that if the deferred income is not taxed it never will be. This is not the case, since the income must eventually be remitted to U. S. citizens and is then taxed in the normal way.

There are practical difficulties in the way of the Administration's reaching out to tax such income as well. Not all the ventures abroad are 100% owned by the oil companies. Most of them have private local shareholders and these must be given consideration. Often control of the money rests in other hands. Local restrictions on the repatriation of profits may compel the subsidiary abroad to retain its earnings.

Still another aspect is the impact that such regulations might have on U. S. employees working abroad. The United States enacted tax incentives to persuade its citizens to live and work outside her borders. One of the important reasons was to make it attractive for American technicians and personnel to go abroad under President Truman's Point Four program. The so-called "movie star loophole" was taken care of by a ceiling of $20,000 per year, but a tax inducement is still often necesary to induce U. S. citizens to work abroad, and to enable them to save money. If the incentive is reduced they will no longer continue to endure the heat of a Lake Maracaibo or the winds of Tierra del Fuego.

Any tax changes must be carefully studied with industry help before enactment if the government's aim of an improved balance of payments is to be achieved. The outflow of American funds for investment abroad creates an equal and sometimes greater stream of dividends in reverse and does not constitute a net drain. An outward flow of U. S. skills and technicians is one of the strongest forces for higher living standards and Western solidarity that exist—stronger even than the outflow of government funds that has gone into the Point Four and similar activities.

Tax structure should be constantly watched by the government to ensure equitable treatment of investment. Changes should encourage investment abroad, however, not discourage it.

Adolfo Lopez Mateos, President of Mexico.

Pascual Gutierrez Roldan, Director General of Pemex

Oil is vital to Mexico

by **Pascual Gutierrez Roldan,**
Director General
Petroleos Mexicanos

MEXICO depende en más alto grado del petróleo y elgas para satisfacer sus necesidades de energía que la mayor parte de los países del mundo. Su población crece muy aceleradamente y la demanda de productos petroleros aumenta a una tasa casi tres veces mayor. El país se industrializa y por eso la industria del—acero duplica su producción cada cinco años y la del petróleo se ve obligada a un esfuerzo que frecuentemente es superior a su posibilidad normal de expansión, pues debe satisfacer a un consumo que demanda cada año de ocho a doce por ciento más productos petroleros, excepto en algunos cortos períodos de recesión, como el que ocurrió durante el segundo semestre de 1960.

Las industrias extractivas para la exportación, dominadas por capital extranjero, han sido las industrias tradicionales de México; de ahí que el cultivo de la tierra sea, históricamente, la actividad fundamental del sistema económico nacional, no obstante ser las condiciones naturales poco favorables a la agricultura.

El desarrollo y la diversificación de las industrias es un fenómeno reciente, pues data de la segunda guerra mundial, pero se realiza con una rapidez y una energía extraordinarias; con una aceleración superior a los recursos propios de un país cuyo ahorro nacional aún no llega a ser importante, porque hasta hace un cuarto de siglo México se mantuvo como fuente de materias primas para la exportación y sufre los efectos de una insuficiente reinversión de utilidades y del traslado a otros países de intereses de capital, bajo un sistema de libre cambio monetario que nuestros gobiernos no han abandonado ni en las más críticas circunstancias.

Cuando un país que posee recursos naturales suficientes y tiende a industrializarse rápidamente sin contar con grandes reservas de capital, no siempre encuentra en los métodos usuales una solución para su problema de desarrollo que satisfaga a su legítimo interés nacional, y tiene necesidad de recurrir a procedimientos que no se explicarían si fueran otras las condiciones existentes.

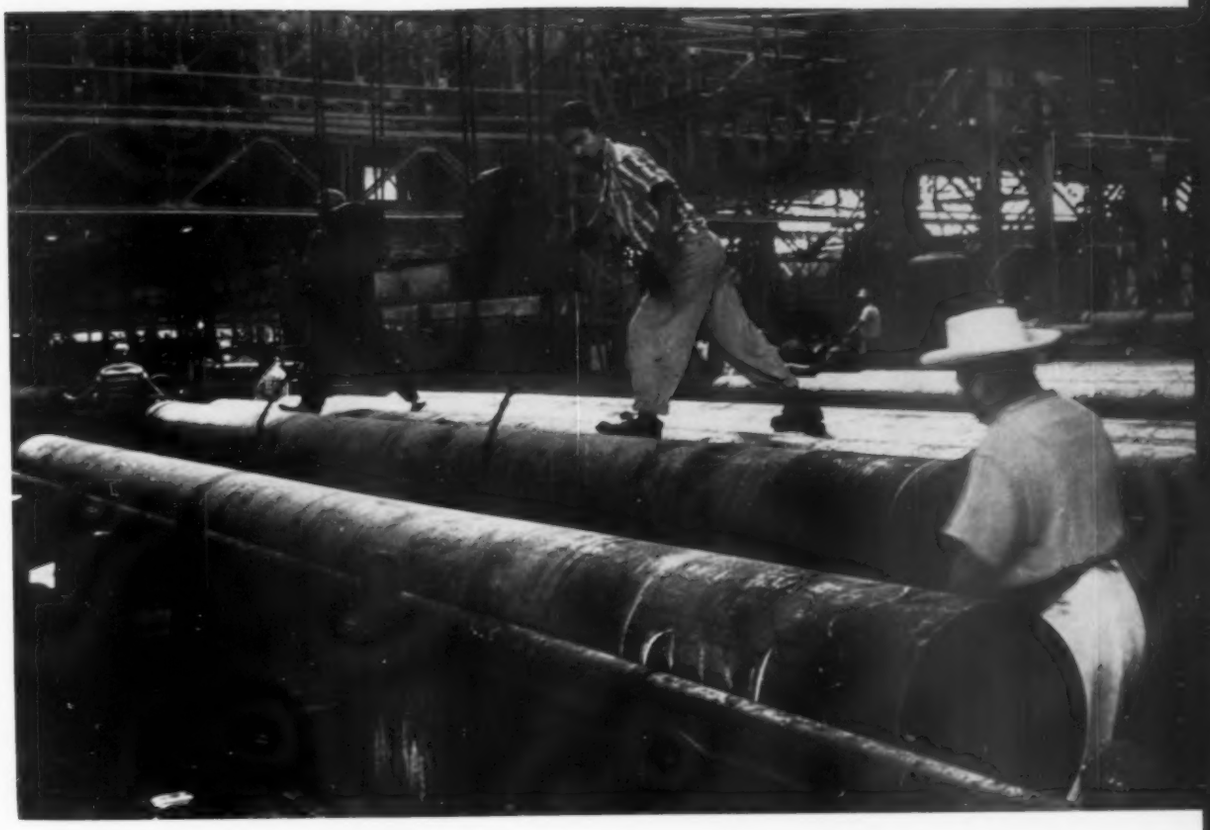
Los recursos nacionales de aceite y gas, que Petróleos Mexicanos administra en su totalidad, se explotan industrialmente con el fin principal de apoyar el desarrollo general de la economía mexicana, dentro de la máxima estabilidad posible y sin perder de vista la necesidad que Pemex obtenga los medios suficientes para su propia expansión como industria y para cumplir la obligación legal que tiene de tributar a la hacienda pública.

Como ocurre en algunos sistemas económicos comparables al de México, se ha procedido en este país a practicar una combinación de los recursos públicos y los intereses privados, sin la cual no se alcanzaría la tasa requerida de aumento en el producto national, frente a un crecimiento demográfico tan rápido y con una escasez de capitales de inversión tan evidente.

Petróleos Mexicanos es un ejemplo de esta coordinación de actividades entre el capital público y el capital privado. Para cumplir su múltiple función dentro del sistema económico nacional, ha tenido que abandonar la política de subsidios que sostuvo durante veinte años en apoyo de la naciente industria mexicana—mediante la venta de productos con frecuencia a bajo del costo—para entrar en un período de operación remunerativa que le permite ya, desde hace dos años, equilibrar su economía.

(Continued on page 44)

Mexico produces its own line pipe and steel, one of the few countries of Latin America that does so. This is the TAMSA plant, which supplies Pemex needs and exports occasionally to the United States (All photos by Hector Garcia)



MEXICO is much more dependent on petroleum and natural gas for her energy requirements than most other countries of the world. Her population is growing rapidly and her petroleum demand is rising at a rate almost three times as fast. The country is becoming industrialized and for that reason the steel industry is doubling its production every five years, while the production of petroleum is forced to keep pace in an effort which frequently is greater than its normal potential expansion, in order to satisfy a demand for petroleum products which increases every year by 8 to 12%, with the exception of some short periods of recession such as occurred during the second half of 1960.

The extractive industries for export, dominated by foreign capital, have been traditional in Mexico, just as cultivation of the land historically has been the basis of the national economic system, despite natural conditions little favorable to agriculture.

The development and the diversification of industry is a recent phenomenon which dates from the second World War, but is now going on with extraordinary speed and force, accelerating faster than the actual resources of a country. The national savings still have not become substantial because until a quarter of a century ago Mexico remained a source of raw materials for exportation and suffers now from the effects of insufficient reinvestment of profits and from the export to other countries of the interest on capital, under a system of free monetary exchange which our governments

(Continued on page 45)

MEXICO—CRUDE OIL, CONDENSATE AND ABSORPTION LIQUIDS PRODUCTION BY ZONES—1960

(Barrels)

Zone or District	Crude	Condensate	Absorption Liquids	Total
NORTHERN ZONE				
Northeastern District	1.039.693	14.686	2.159.268	3.213.647
Northern District	11.074.456	—	—	11.074.456
Southern District	6.205.016	—	7.535	6.213.551
CENTRAL ZONE				
Poza Rica District	45.222.259	—	2.543.984	47.766.243
New Golden Lane Dist.	9.908.235	—	—	9.908.235
Veracruz District	960.614	—	—	960.614
SOUTHERN ZONE				
Isthmus of Tehuantepec District	7.300.066	—	98.495	7.398.561
Tabasco District	17.321.634	1.611	4.913.031	22.236.276
Total	99.032.973	16.297	9.722.313	108.771.583

Source: Petroleos Mexicanos.

MEXICO—DRILLING DATA BY ZONES DURING 1960

EXPLORATION

Zone or District	Oil	Gas	Dry	Total	Footage Drilled
Northern Zone	3	5	50	58	444.367
Central Zone (Veracruz Dist.)			6	6	34.779
Poza Rica District & New Golden Lane	4		10	14	122.432
Southern Zone	4	3	18	25	199.937
Total	11	8	84	103	801.515

DEVELOPMENT

Northern Zone	158	15	39	212	1.333.463
Central Zone (Veracruz Dist.)					
Poza Rica District & New Golden Lane	125	2	20	147	1.198.298
Southern Zone	246	13	41	300	1.933.633
Total	529	30	100	659	4.465.394
Grand Total	540	38	184	762	5.266.919

% Successful: 76. Source: Petroleos Mexicanos.

Mexican drillers on a Poza Rica rig floor

Left: Scene of construction, now completed, on the Ciudad Pemex Mexico City gas line. This is the swampy area of Laguna Limon

completar su integración industrial, afrontar las exigencias de la demanda interior y cumplir sus obligaciones fiscales. Petróleos Mexicanos produce para el mercado doméstico y únicamente exporta residuales y pequeños volúmenes de aceite asfáltico.

Pero si el petróleo ha dejado de subsidiar el desarrollo industrial, en cambio contribuye poderosamente a acelerarlo y a equilibrarlo por medios más sanos, al realizar un amplio programa deobras — grandes líneas nuevas para gas, aceite y productos refinados; rápido aumento de la capacidad instalada de refinación, perforación de pozos adecuada a las necesidades y, en fin, aunque no en último término, exploración geológica tan activa como es preciso hallarla para mantener una relación conveniente entre la explotación y la reserva.

La exploración se ve continuamente retribuída por el descubrimiento de nuevos campos productores, algunos de ellos verdaderas promesas para el futuro petrolero del país.

El programa inmediato comprende doce obras mayores de desarrollo para la industria petrolera, y de ellas, en dos años, seis se concluyeron y están en servicio. Se continúa, dentro de las posibilidades normales de la empresa, la ejecución material de los proyectos, grandes, medianos y pequeños, que se incluyen en el programa.

A mediados de 1961 puede afirmarse que Petróleos-Mexicanos no quedará en muchos años por venir, atrás de las exigencias de su mercado, el cual requiere en el presente 330 mil barriles diarios de petróleo para el consumo. Las reservas probadas de aceite y gas se aseguran el consumo nacional y sus incrementos estimados, cuando menos durante los veinte años venideros, y continúan en crecimiento.

Pero además de lo expuesto hasta aquí, Petróleos Mexicanos realiza un vasto plan para crear en México la industria petroquímica, manufacturando y poniendo en el mercado los materiales básicos a disposición de los fabricantes, que podrán contar con un suministro de elementos transformables a precio regular, lo cual les permitirá desarrollar y diversificar la industria química de productos finales, sin que el país debilite su reserva monetaria.

La construcción de las plantas petroquímicas se comenzó en 1959. Pocos meses después se puso en servicio la primera planta para producir lo substancia básica para los detergentes, el dodecilbenceno, la cual opera con gran éxito para un mercado que reclama ya una segunda unidad, la que se construye en Tampico.

En 1960 se terminó una planta más de azufre, y están a punto de concluirse dos plantas de amoníaco anhidro. Otras obras prosiguen su curso normal.

Cuatro son las ramas de la petroquímica básica que están en proceso de desarrollo: la de los fertilizantes, que permitirá aumentar la producción unitaria de la tierra y el volumen global de las cosechas, devolviéndole al suelo la fertilidad perdida por siglos de monocultivo; la del hule artificial, que ofrecerá amplio abastecimiento al consumo y ahorrará divisas al país; la de los plásticos, que suministrará materiales a numerosas industrias existentes y estimulará el establecimiento de otras nuevas, y la do los aromáticos, cuyo uso industrial es muy extenso. Además, se fabricará en México el tetraetilo de plomo.

Por ley se reserva a Petróleos Mexicanos la producción de los materiales considerados básicos en la petroquímica, y se deja abierto el campo a la libre empresa para los procesos de fabricación.

A las industrias químicas de capital privado, Pemex no solamente les proporcionará materiales en abundancia y a precio uniforme, sino que les transfiere, si lo piden, parte de los créditos que obtiene en mercados internacionales para financiar el desarrollo de la industria química mexicana.

Si como empresa productora Petróleos Mexicanos va en apoyo de las empresas privadas, en una asociación de actividades, también como consumidora ejerce una influencia importante sobre el desarrollo económico del país: es la mayor consumidora de acero mexicano de alta calidad, y así contribuye a robustecer una de las tres bases de la nueva economía mexicana, la cual tiende a sustentarse sobre la industria petrolera, la siderúrgica y la química.

Al dar nacimiento a la industria petroquímica y al consumir grandes volúmenes de acero y de otros productos nacionales, Petróleos Mexicanos se encuentra colocada en posición central a la base de la nueva economía mexicana.

Las excelentes perspectivas de la industria petrolera y las posibilidades de futuro desarrollo económico del país, han abierto las puertas del crédito bancario internacional a Petróleos Mexicanos y a otras empresas públicas y privadas, que aumentan cada año sus actividades en provecho de ellas mismas y de la nación mexicana. END

have not abandoned even in the most critical times.

When a country which possesses sufficient natural resources and which is tending to industrialize rapidly cannot count on large reserves of capital, usual methods and solutions are not always adequate to solve its development problems and at the same time satisfy its legitimate national interest. It has need, then, to fall back on methods which would not be used were conditions different.

The resources of oil and gas which Petroleos Mexicanos administers are exploited industrially with the principal aim of supporting the general economic development of Mexico, with maximum possible stability and without losing sight of Pemex's need for sufficient means for its proper expansion as an industry and to fulfill the legal obligation it has to the public treasury.

As occurs in other economic systems comparable with that of Mexico, a combination of public and private resources has been used, without which the task of increasing the national product would not go forward, faced as it is with a rapid population increase and with such an evident scarcity of investment capital.

Petroleos Mexicanos is an example of this coordination of activity between private and public capital. In order to fulfill its multiple function within a national economic system it has tended to abandon the policy of subsidies which had helped support new Mexican industry for some twenty years—by sale of products at prices frequently below their actual cost—to enter into a period of profitable operation which has permitted Pemex during the past two years to stabilize its economy, complete its industrial integration, meet interior demand and comply with its fiscal obligations. Petroleos Mexicanos produces principally for the domestic market and only exports residuals and small volumes of asphalts.

But if petroleum has ceased to subsidize national industry, on the other hand it now contributes heavily to it by speeding development and by stabilizing it by more healthy means, as well as by carrying out large works programs: large new lines for gas, oil and refined products; a rapid increase in installed refining capacity; drilling of sufficient wells; and, last but not least, active geological exploration to maintain a proper relation between development and reserves.

Exploration has been rewarded by the discovery of new producing fields, some of which hold a truly great promise for the future of petroleum in the country.

The immediate program of Pemex entails twelve major undertakings for development of the petroleum industry. Of these, six have been concluded and put into service in two years. The remaining projects—large, medium and small—are going ahead normally. As of mid-1961, Petroleos Mexicanos stands only a few years from completion of its aims, accomplished while satisfying Mexican oil demand, presently 330,000 b/d. Proved reserves of oil and gas assure satisfaction of national demand and its estimated increases, as they have during the past 20 years.

Apart from this, Petroleos Mexicanos is carrying out a vast plan for the creation in Mexico of a petrochemical industry, manufacturing and putting on the market basic materials for the use of manufacturers, who will be able to count on a regular supply at stable price of transformable elementary materials. These will permit the chemical industry to develop and diversify its range of finished products without draining the country of its monetary reserve.

Construction of petrochemical plants began in 1959. A few months later there was put into service the first plant for production of the basic component of detergents, dodecylbenzene. This plant was extremely successful, and market demand now requires a second unit, presently under construction at Tampico.

In 1960 there was completed another sulfur plant, and two anhydrous ammonia plants are now on the point of completion. Other projects are in their normal stage of work.

Four branches of basic petrochemistry are now under development. The first is production of fertilizers, which will permit an increase in the unitary production of the soil and boost harvest volume, returning to the soil the fertility which has been lost through centuries of monoculture. Others include manufacture of artificial rubber, which satisfies a strong consumer need and will save the country considerable foreign exchange; plastics, which will supply raw material to numerous existing industries and stimulate the establishment of new ones along with the manufacture of aromatics, the uses for which are very extensive. Finally, there will be manufactured in Mexico tetraethyl lead.

By law the production of materials considered basic to petrochemistry is reserved to Petroleos Mexicanos, and the field of fabrication using these basic materials is left open to private enterprise.

To private enterprises in the chemical field, Pemex will not only supply abundant raw materials and at a uniform price, but will, on request, share with them credit obtained in international markets for the development of the Mexican chemical industry.

If as a producing enterprise Petroleos Mexicanos supports private enterprises, in association with them it also exerts an important influence on the economic development of the country as a consumer. It is the largest consumer of high quality steel in the country and thus contributes to strengthen one of the three bases of the new Mexican economy; oil, steel and chemicals.

Thus, by giving birth to the petrochemical industry, and by consuming large quantities of steel and other national products, Petroleos Mexicanos finds itself in a central position at the base of the new Mexican economy.

The excellent perspectives of the petroleum industry and the possibilities of future economic development of the country, have opened the doors of international bank credit to Petroleos Mexicanos and to other enterprises, public and private. Each year they are increasing their activities, both to their own benefit and to that of the Mexican nation. END

Antonio Vargas MacDonald, political figure and public relations coordinator for Petroleos Mexicanos

MEXICO—NATURAL GAS PRODUCTION BY ZONES—1960

(Thousands of Cubic Feet)

Zone or District	
NORTHERN ZONE	
Northeastern District	121,029,330
Northern District	12,370,687
Southern District	4,024,082
CENTRAL ZONE	
Poza Rica District	69,200,501
New Golden Lane District	5,265,526
Veracruz District	193,700
SOUTHERN ZONE	
Isthmus of Tehuantepec District	5,427,902
Tabasco District	123,796,358
Total	341,308,086

Source: Petroleos Mexicanos.

World oil demand in 1961 will rise to over 23 million barrels daily

Eastern hemisphere's share of this 6.3% increase now at 45.5%. Europe maintains high rate, and Japan continues its spectacular growth in Far East

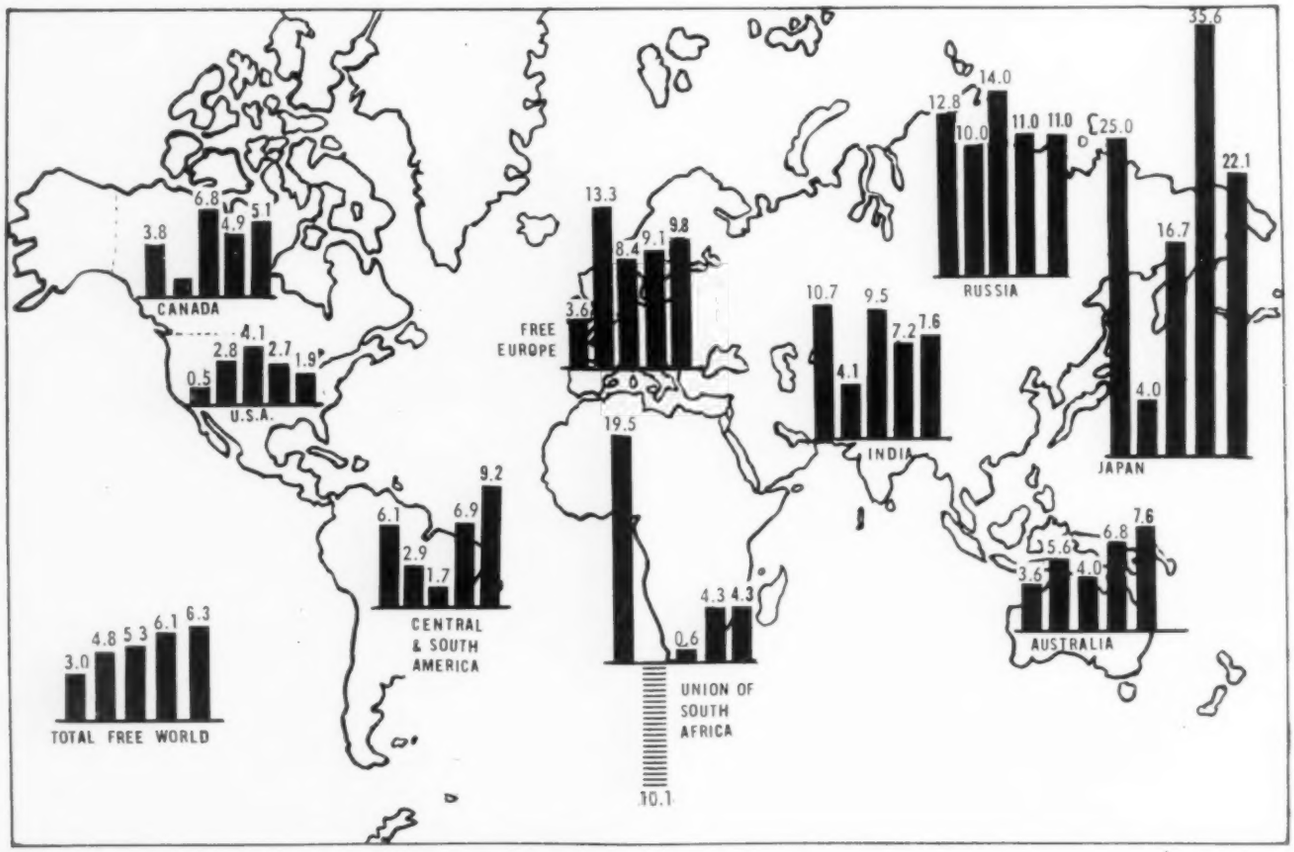


Fig. 1—Trends in petroleum consumption—year-to-year percentage changes, 1956-57, 57-58, 58-59, 59-60, and 60-61.

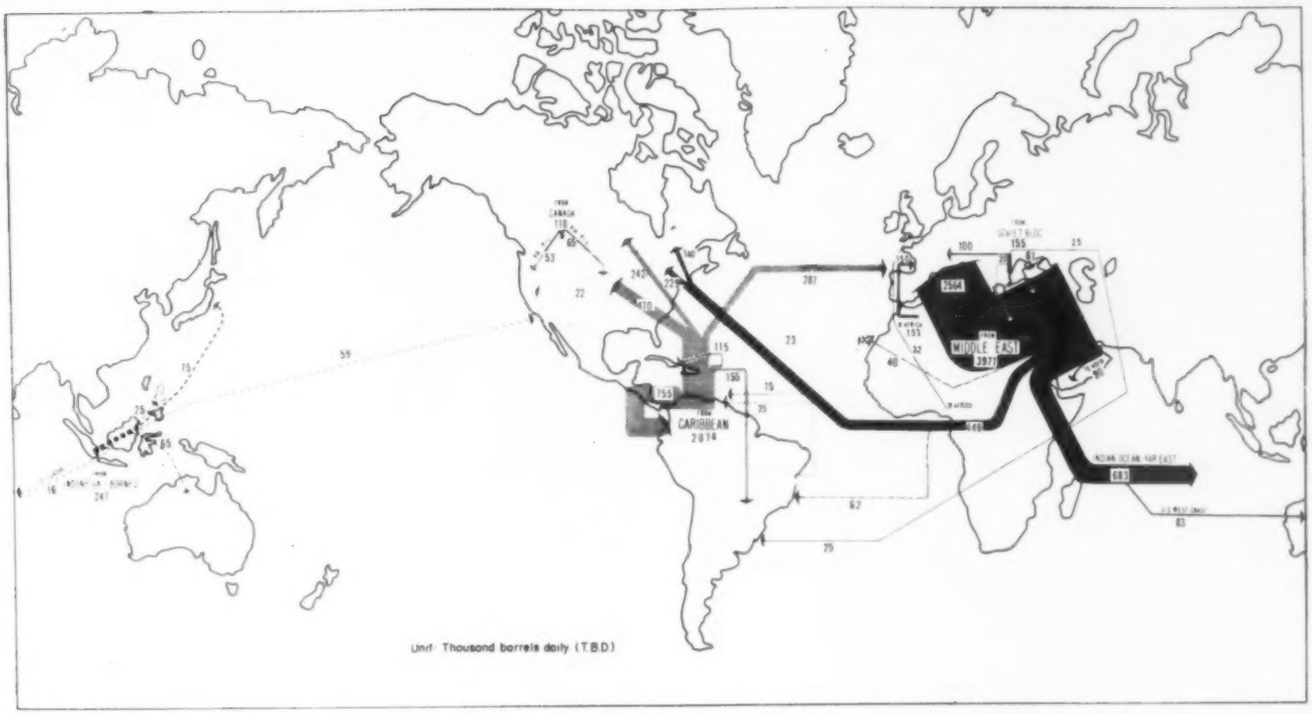


Fig. 2—Chart showing principal intercontinental flow of oil as estimated for 1960. Office of Oil and Gas, U. S. Department of the Interior.

THE TOTAL WORLD DEMAND for petroleum will rise 6.3% to 23,102,000 b/d this year. This is an increase of 1,373,800 b/d over the 1960 level of 21,728,200 b/d, the prediction being based upon estimates developed by WORLD PETROLEUM from available international oil consumption data.

This forecast for growth in 1961 compares with an increase in demand in 1960 of 6.8%, or 1,377,600 b/d; and 6.9%, or 1,316,000 b/d, in 1959. The final figure for 1960, incidentally, is within 0.2% of the 21,682,500 b/d forecast a year ago by this magazine.

In the non-Communist world, total demand is expected to rise 5.6%, from a 1960 level of 18.7 million b/d to a 1961 level of 19.8 million b/d.

Continued strong industrial activity throughout the Eastern Hemisphere accounts for the anticipated world growth trend. The rise of 10.6% in demand this year for the eastern half of the world is more than three times the 3% rate expected in the west. In terms of daily barrels, these increases will be 1,007,800 in the east and 366,000 in the west.

As a result, the Eastern Hemisphere's share of total world consumption continues to move toward half. It will be 45.5% this year. In 1960, it was 44%; in 1959 it was 41.2%; and in 1949 it had been 29.5%.

Several other shifts and trends of interest are indicated, as shown in Table 1:

(1) The rate of increase in USA consumption is still dropping. This year the rise will be only 1.9%, from 9,677,000 b/d to 9,859,000 b/d. A year ago it was 2.7%.

(2) Canada is showing a strong comeback, due in all probability to the decision late in 1960 on a firm national oil policy. The 1961 increase of 5.1%, from 858,000 b/d to 902,000 b/d, is higher than the 2.5% indicated in forecasts made early this year. It is also greater than the increase a year ago, of 4.9%.

(3) The growth in Latin America likewise is stronger than was first anticipated. Demand will rise some 9.2%, compared with an earlier forecast for about 6%. In 1960, this area increased its consumption 7.3% over 1959. Brazil is expected to move past Argentina as the largest consuming country in South America, although both remain below Mexico among all Latin American nations.

(4) Europe continues to be the dominant region in the Eastern Hemisphere. Growth rates are still strong in Germany (15%), Italy (13%), the Netherlands (14.8%), and Switzerland (15.2%). The United Kingdom, with an expected increase of 7.9%, remains Europe's largest consumer, and for the first time, will raise its demand above 1 million b/d. For the second consecutive year, the UK will be the third largest consuming nation in the world, after the USA and the USSR. A spurt in industrial activity in Spain will account for that country's 20% rise in demand.

(5) The overall growth rate for Europe continues high. In fact, at 10.4%, it shows an increase over the 10% rate of a year ago. There are no signs anywhere of a let-up in activity. Even those countries with the smallest increases are all higher than the United States.

(6) Japan is still the most significant factor in the demand for petroleum in the Far East. It will show a spectacular 22% growth this year, rising to about 745,000 b/d. This will shift Japan into fifth place among all consuming nations in the world, moving it ahead of West Germany.

The changes that have been taking place in the world petroleum consumption pattern over the past several years are shown in the chart in Fig. 1. Year-to-year changes in demand for a number of selected areas are shown.

The effects of the trends in consumption on world movement of petroleum is shown in the chart in Fig. 2 and Table 2. These

TABLE 1—ESTIMATED WORLD CONSUMPTION OF PETROLEUM PRODUCTS
(Crude equivalent basis,[1] 1,000 b/d)

	1960	1961	Percent Increase
Canada	858.0	902.0	5.1
Mexico	287.0	303.0	5.6
United States[2]	9,677.0	9,859.0	1.9
NORTH AMERICA	**10,822.0**	**11,064.0**	**2.2**
Argentina	267.0	285.0	6.8
Bolivia	5.7	5.9	3.5
Brazil	264.1	292.5	10.8
Chile	48.1	51.3	6.6
Colombia	55.2	70.0	27.0
Costa Rica	2.8	2.9	3.6
Cuba	75.2	85.0	13.3
Dominican Republic	7.8	8.0	2.5
Ecuador	12.3	12.9	4.9
Guatemala	8.0	8.4	5.0
Guianas	4.6	4.9	6.5
Haiti	1.7	1.8	5.9
Honduras	4.1	4.2	2.4
Jamaica	14.9	15.7	5.3
Netherlands Antilles	169.1	170.0	0.5
Nicaragua	3.9	4.0	2.5
Panama	24.2	25.1	3.6
Paraguay	1.8	1.9	5.5
Peru	48.7	53.0	8.8
Puerto Rico	58.4	60.0	2.7
Trinidad & Tobago	47.6	49.0	2.9
Uruguay	30.5	31.7	3.9
Venezuela	163.0	180.0	10.2
SOUTH AMERICA & CARIBBEAN	**1,359.0**	**1,483.0**	**9.2**
WESTERN HEMISPHERE	**12,181.0**	**12,547.0**	**3.0**
Austria	57.2	62.4	9.1
Belgium & Luxembourg	155.0	168.0	8.4
Denmark	108.0	117.0	8.3
Finland	49.3	54.0	9.6
France	550.0	590.0	7.3
Germany (West)	627.6	721.4	15.0
Gibraltar	11.0	11.1	9.1
Greece	47.6	49.5	4.0
Iceland	7.7	7.9	2.6
Ireland (Eire)	27.7	28.6	3.2
Italy	450.9	510.0	13.0
Netherlands	243.9	280.0	14.8
Norway	73.5	78.9	7.3
Portugal & Islands	34.8	37.1	6.6
Spain	105.2	127.2	20.9
Sweden	265.5	273.0	2.8
Switzerland	77.8	89.6	15.2
United Kingdom	943.1	1,018.0	7.9
Yugoslavia	28.3	31.0	9.5
USSR and Bloc	2,900.0	3,220.0	11.0
EUROPE	**6,886.7**	**7,600.0**	**10.4**
Algeria	39.7	44.8	12.8
Angola	4.8	5.5	14.6
Canary Islands	60.0	63.4	5.7
Congo	9.1	9.1	—
Ethiopia	2.6	2.8	7.7
Egypt (UAR)	89.8	98.7	9.9
East Africa	27.2	28.2	3.7
French West Africa	11.2	11.8	5.3
Ghana	9.8	10.2	4.1
Libya	5.6	7.0	25.0
Morocco	19.8	20.8	5.1
Nigeria	15.9	16.0	0.6
South Africa	103.5	108.0	4.3
Sudan	9.6	10.6	10.4
Tunisia	10.8	12.0	11.1
AFRICA	**498.0**	**532.0**	**6.8**
Aden	72.5	73.6	1.5
Bahrain	28.5	29.6	3.8
Iran	144.0	149.0	3.5
Iraq	41.7	42.6	2.2
Israel	38.0	43.6	14.6
Jordan	3.9	4.1	5.1
Kuwait	89.4	96.0	7.4
Lebanon	17.6	17.9	1.7
Neutral Zone	15.8	17.6	11.4
Saudi Arabia	68.2	76.3	11.9
Syria (UAR)	18.7	21.3	15.8
Turkey	53.0	59.2	11.7
MIDDLE EAST	**590.0**	**648.0**	**9.8**
Australia	225.0	242.0	7.6
Burma	11.0	11.8	7.3
Ceylon	20.8	22.3	7.2
China	95.0	100.0	5.2
Hong Kong	25.9	28.4	9.7
India	163.9	176.4	7.6
Indonesia	82.6	88.6	7.3
Japan	610.0	745.0	22.1
Korea, South	19.6	20.2	3.0
Malaya & Singapore	71.0	71.8	1.1
New Zealand	42.1	44.8	6.4
Pakistan	51.6	54.7	6.0
Philippines	55.2	60.0	8.7
Taiwan	21.2	22.3	5.2
Thailand	26.4	29.6	12.1
Vietnam, Laos, Cambodia	16.8	18.9	12.5
FAR EAST & OCEANIA	**1,572.5**	**1,775.0**	**12.8**
EASTERN HEMISPHERE	**9,547.2**	**10,555.0**	**10.6**
WORLD TOTAL	**21,728.2**	**23,102.0**	**6.3**
FREE WORLD TOTAL	**18,733.2**	**19,782.0**	**5.6**

[1]Includes natural gas liquids and refining and marketing losses. Estimates of military liftings are not shown as domestic consumption in some countries, but are included in area and world totals, hence totals are greater than the sum of the items shown.

[2]Includes Alaska and Hawaii.

TABLE 2—FLOW OF THE WORLD'S OIL—1960
(1,000 b/d)

From: / To:	USA	Other W. H.	West. Europe	Africa	Australasia	Other E. H.	USSR	Total Exports
United States	—	66	44	—	—	98	—	208
Caribbean	1,263	805	555	77	—	—	—	2,700
Other West. Hemisphere	124	—	—	—	—	—	—	145
Western Europe	—	—	—	129	—	21	10	160
Africa	—	—	237	—	—	—	—	237
Far East	82	—	41	—	102	205	—	430
Middle East	347	205	2,724	225	165	1,024	—	4,690
USSR & Bloc	—	40	337	60	—	20	—	457
Total Imports	1,816	1,116	3,959	491	267	1,368	10	9,027

Source: "Statistical Review of the World Oil Industry, 1960," British Petroleum Co. Ltd.

data illustrate clearly the changes in flow from the world's important producing areas into the important consuming areas, and the growing impact of Saharan oil and the Soviet exporting program.

Exports from Africa—entirely to Western Europe—have risen about 50%, from a little over 300,000 b/d in 1959 to an estimated 457,000 b/d last year. Those from the Soviet countries—primarily to Europe—have risen about 50%, from a little over 300,000 b/d in 1959 to an estimated 457,000 b/d last year.

Most of this change has been at the expense of oil from the Middle East, whose share of the European market dropped from 73% in 1959 to 69% in 1960, although actual volume rose some 4%. African crude oil's share of the European market is now 6% for 1960 as compared with 2.2% in 1959. And Soviet oil's share has increased from 6.7% to 8.5%. Exports from the Venezuelan area to Europe rose in proportion with the European needs, so that Venezuela's share remained constant at about 14%.

Table 3 shows a breakdown between crude oil and refined products in the world movement of petroleum. Data from the previous year were not available for as many specific areas, hence no direct comparisons can be drawn for all the regions tabulated.

In the case of the world total, crude oil represented 68% of the flow in 1960 compared with 64% in 1959. Crude oil represented 81.7% of European imports; it was 80% in 1959. And in United States imports, it was 56.9% in 1961 and 53.2% in 1959. END

TABLE 3—INTERNATIONAL OIL TRADE—1960
(1,000 b/d)

Exports from:	Crude	Products	Total
United States	9	199	208
Other North America	104	21	125
Caribbean	1,283	1,417	2,700
Other West. Hemi.	20	—	20
Western Europe	10	150	160
Middle East	4,096	594	4,690
Africa	215	22	237
East Indies	246	164	410
Other East. Hemi.	—	20	20
USSR & bloc	179	278	457
TOTALS	6,162	2,865	9,027
Imports into:			
United States	1,029	787	1,816
Other West. Hemi.	685	431	1,116
Western Europe	3,232	727	3,959
Japan	547	63	610
Australia	212	55	267
USSR and bloc	10	—	10
Africa	143	348	491
Other East. Hemi.	304	233	537
Unallocated*	—	221	221
TOTALS	6,162	2,865	9,027

*Military use; increased quantities in stock and in tranit. Source: same as Table 2.

World crude production rising

World production of crude oil rose an estimated 4.1% during the first nine months of 1961. Good increases were shown in the Middle East and Argentina

WORLD PRODUCTION of crude oil during the first nine months of 1961 was rising appreciably throughout the world, although United States levels remained nearly unchanged. The world total, including Soviet production, was up during the first nine months of the year to over 22 million barrels daily. The year's total is expected to surpass that since the coming winter months in Northern latitudes will boost production of fuels for heating.

The United States' decline relative to the rest of the world is an historic trend which has steadily reduced the proportionate share of its production as the remainder of the world continues to grow more rapidly. During 1961 the United States' share of world production is expected to decline to about 40%; while that of the rest of the world will grow, especially the Russian and Middle Eastern areas.

Chiefly because of this decline in the United States, the Western and Eastern Hemispheres follow in the same trend. The rate of increase in the Western Hemisphere is expected to total only about 4.5% during 1961, while the Eastern is expected to grow by about 15%.

Areas of principal increase in the first three-fourths of 1961 were the Middle East, North Africa and Argentina in the Free World. Within the Communist Bloc, Russian production has risen steadily spurred by an accelerating demand and the need for an exportable surplus. Russian industrialization can only proceed on schedule if the necessary capital equipment is forthcoming from the industrialized nations of the world. Oil is the Soviet's principal exportable commodity that is available in sufficient amounts to bring revenues to pay for these machinery imports. For that reason the Russians are pushing the export of oil and seem destined to increase it more in the future. Russian production has increased sharply and the USSR is now the world's second largest producer, far behind the United States as yet but catching up fast.

The Middle East, always a major source for oil, has continued a rapid upward climb, led by the tiny nation of Kuwait. Middle Eastern production during the first 9 months of 1961 was up by 9.4% over the same period in 1960. Principal producer was Kuwait, despite the political crisis caused by the attempted annexation by Iraq. That dispute affected production there only slightly. Iran registered the most striking increase in her rate of production, with a rise of about 16% over 1960 levels. Saudi Arabia was not far behind, with a 15% increase. Production in the Neutral Zone, jointly owned by Kuwait and Saudi Arabia, showed a sharp increase as production by Japanese interests offshore began for the first time. Onshore production inched upward in the Neutral Zone to approximately 160,000 b/d for the first time. A concession agreement was signed in mid-1961 by American Independent Oil, one of the two partners in production of oil in this area, and presumably a similar agreement will have to be signed eventually by the other partner there, Getty Oil Co. They are not expected to influence oil production levels, however.

Iraq's oil industry suffered somewhat as a result of the controversy between the government and Iraq Petroleum Co., the principal producer there. Exploration has ceased on the government's command, although production has held up reasonably well with an increase of 3% registered in the first three-fourths of 1961.

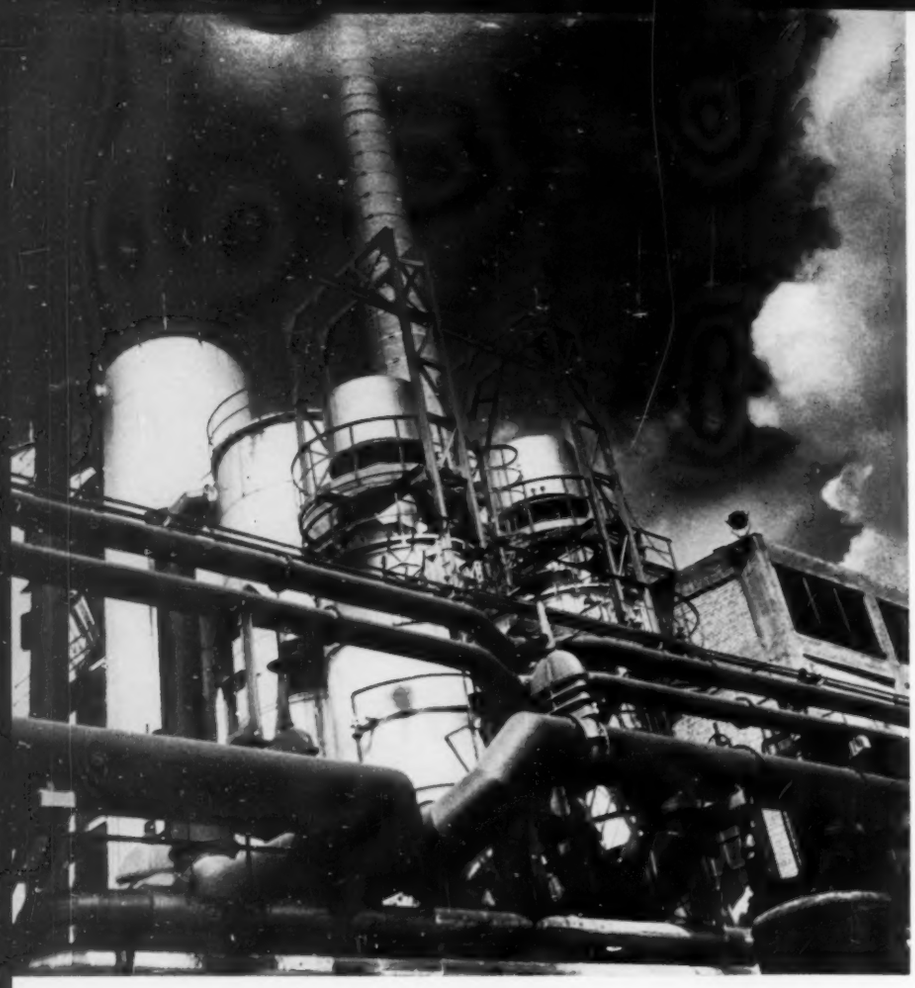
Two new areas seem destined to come into production in this prolific area soon. Abu Dhabi will begin offshore production in 1962 as British Petroleum and Cie. Francaise des Petroles bring their discovery into world markets. Onshore, the Trucial Coast will see its first commercial oil production as the Murban discovery appears ready for development.

North Africa showed little improvement during the first part of 1961 and political upheavals held back production. The really spectacular increases in this area's production occurred during 1960 when production from the French Sahara brought it into the front rank of the world's oil producers. It will take its next "great leap forward" when Libyan oil finds come into play with the completion of pipelines to the Mediterranean. There are two major lines planned, one from Ohio Oil et al discoveries and the other from finds by Standard Oil Co. (New Jersey) through its affiliate, Esso Libya. The latter discovery is the closest to actual production, since the pipeline there has been nearly completed and will begin transporting oil very soon. The French Sahara has had its troubles. The Tunisian incident led to a curtailment of shipments from the Edjeleh field, and Hassi Messaoud continued to struggle with technical problems in production. Despite these difficulties production was up sharply over 1960. END

WORLD CRUDE OIL PRODUCTION

(Barrels Daily)

Country	1961 (1st 9 Months) (Prelim.)	1960 (Final)
United States	7,150,000	7,035,336
Canada	615,000	526,891
Mexico	287,100	270,626
Total No. America	8,052,100	7,830,120
Argentina	220,000	175,497
Bolivia	7,900	9,765
Brazil	93,000	80,909
Chile	21,000	19,757
Colombia	155,000	152,093
Cuba	250	295
Ecuador	8,400	7,459
Peru	52,400	52,609
Trinidad	124,100	115,729
Venezuela	2,950,000	2,846,196
Total So. Amer. & Caribb.	3,632,050	3,460,297
Total West. Hemisphere	11,684,150	11,290,417
Austria	44,800	46,104
France	44,100	38,877
Germany (West)	118,100	109,497
Italy	38,000	37,008
Netherlands	37,200	36,551
United Kingdom	1,700	1,773
Yugoslavia	21,000	18,227
Total Western Europe	301,900	288,038
Angola	1,400	1,303
Gabon	16,100	16,369
Libya	—o—	—o—
Morocco	1,600	1,899
Nigeria	31,400	17,902
Sahara (OCRS)	305,400	184,175
Total Africa	355,900	221,648
Albania (Est.)	10,600	11,000
Bulgaria (Est.)	3,900	3,742
Czechoslovakia (Est.)	2,800	2,416
Germany (East) (Est.)	90	100
Hungary (Est.)	25,600	24,000
Poland (Est.)	3,700	3,864
Romania (Est.)	234,000	231,300
USSR (Govt. Est.)	3,250,000	2,960,000
Total USSR & Bloc	3,530,690	3,236,422
Bahrain	45,100	45,082
Egypt	69,000	65,486
Iran	1,275,000	1,067,634
Iraq	967,000	966,757
Israel	2,300	2,541
Kuwait	1,740,000	1,623,710
Neutral Zone	162,000	136,145
Qatar	181,000	172,372
Saudi Arabia	1,345,000	1,247,139
Turkey	7,000	7,169
Total Middle East	5,793,400	5,268,549
British Borneo	91,000	92,910
Burma	10,500	11,142
China (Communist) (Est.)	48,000	100,000
India	9,500	9,208
Indonesia	430,000	418,000
Japan	11,900	10,049
New Guinea	3,300	4,202
New Zealand	20	20
Pakistan	6,100	7,202
Siam (Thailand)	200	200
Taiwan	40	38
Total Asia & Australasia	610,560	552,971
Total Eastern Hemisphere	10,156,298	9,567,628
World Total	21,840,448	20,858,045



Pemex plant for production of synthetic fertilizers. Petrochemical base products are a Pemex monopoly; their elaboration is left open to private enterprise. Photo by Hector Garcia.

CARLOS L. CORCUERA, manager of the refining department of Petroleos Mexicanos, was born in Mexico City in 1906 and is a graduate of Cambridge University, England. From 1931 to 1937 he was employed by Cia. Mexicana de Petroleo "El Aguila," a subsidiary of the Royal Dutch-Shell group. In 1938, he was appointed to the position he now holds. In 1951 products pipelines also were placed under his jurisdiction and since 1959 he has also been actively engaged in matters pertaining to petrochemicals.

Misconceptions about Mexico

by Carlos L. Corcuera
Manager, Refining Department
Petroleos Mexicanos

DUE TO CERTAIN misconceptions that exist about the Mexican oil industry, it seems appropriate at present to discuss some relevant questions which have a bearing on the conduct of Petroleos Mexicanos.

Mexican Oil Wealth and Exploitation Policies: Mexico has substantial natural resources of petroleum, as proved by the fact that it being the ninth largest oil consuming country in the world, its production of crude and natural gas is and has always been greater than the total requirements for domestic consumption.

This does not mean, however, that its potentialities are unlimited; on the contrary, only a moderate, well-defined portion of its territory has sedimentary strata from which oil or natural gas is or could be produced (see map in June 1961 issue of WORLD PETROLEUM).

The distribution of natural resources varies to a very great extent from one part of the world to another. Just as Mexico is the richest silver producing country, its oil and gas resources cannot be compared to those of Arabia and Venezuela. Even Canada has an area with oil possibilities five times larger than that of Mexico.

However, the productive capacity is not necessarily a function of the total area, since it depends largely on the number and characteristics of geological horizons. For example Kuwait, with a total territory of only 2,000 square miles, has more oil reserves than the whole of the United States. In Mexico, very few of the oil fields have more than one productive horizon, as shown by the fact that about 90% of all the oil produced up to the present day has been obtained from the Lower Cretaceous limestones.

The high level of production during the years 1920 to 1923, which quickly reached in 1921 a peak of 193 million barrels, is no proof of Mexico's potentialities; it was simply the result of unrestricted exploitation of the old "Golden Lane" through a few exceptional wells, with a ratio of reserves to production of about 4 to 1. "The proof of the pudding is in the eating": from 1918 to 1923 inclusive, only 1,249 wells were drilled, and from 1924 to 1929 the number of wells drilled was 3,436, yet the production declined to 39.5 million barrels in 1930 and to slightly under 33 million barrels in 1932.

MEXICAN PETROLEUM DATA

Reserves in 1921 (Estimated from existing fields at that date):	777 x 10^6 bbls.
Present proven reserves:	
Oil and condensate	2,800 x 10^6 bbls.
Dry gas	10,120 x 10^9 cu. ft.
Present production:	
Oil and condensate	330,000 b/d
Dry gas	880 x 10^6 cf/day

Note: 350 x 10^6 cf/day of dry gas are returned to the reservoirs.

It has often been stated, even by some outstanding North and South American publications—not so in Europe, where for some reason or other they manage to obtain reliable information—that Petroleos Mexicanos has been reluctant to explore

and drill new areas and that many of the reported new oil fields should be considered as extensions to old ones. It is true that Petroleos Mexicanos, as any other oil company, devotes part of its exploration effort to find extensions of existing oil fields, but more than half of total production comes from entirely new reservoirs and producing areas discovered and developed by Petroleos Mexicanos. In the last June issue of WORLD PETROLEUM, Mr. Antonio Garcia Rojas, Exploration Manager of Pemex, clearly states: " . . . taking into consideration the calorific power of oil and gas, present reserves of fields discovered during the last ten years, many of which have not been fully developed, represent 57% of the total."

Mexico is not, strictly speaking, a rich country in mineral oil resources, as some people might think: furthermore, its territory is very difficult to explore and not easy to exploit. Apart from geological intricacies, it has bothersome mountains such as the Sierra Madre Oriental and large swamps like those encountered in the west Tabasco area, where Petroleos Mexicanos discovered and is now developing to its fullest extent the José Colomo, Ogarrio, La Venta and other important fields.

Present conservation policies both in the United States and Mexico call for a conservative exploitation of oil fields in order to increase ultimate recovery. The soundness of the operating policies of these two North American countries and their exploration efforts is shown by the continuous increase of their proven reserves in spite of the fact that production has to keep abreast of growing domestic consumption.

Refining Expansion and Domestic Demand: The editorial of the June 1961 issue of WORLD PETROLEUM said, amongst other things, "Thus, Pemex is not in an easy position. Forced to concentrate on refining at the expense of exploration, its production cushion has shrunk. Using the forecasts of a 6.5% annual increase in demand which Pemex supplies in this issue, it seems likely that a serious production shortage may be in the offing. It may be that there is unsatisfied demand in the country already. In any case, the situation will become steadily more serious, since the average production increase during coming years is estimated on the basis of past performance at only about 3%."

In the first place, nobody has ever forced Petroleos Mexicanos to do anything at the expense of its most important obligation: discover and produce oil and natural gas; indeed, since 1947 these activities have at all times been given preference. Secondly, anybody who might take the trouble to examine available statistics published in the U. S. Bureau of Mines and many reputable international publications could verify that production of crude and gas in Mexico has at all times been greater than domestic demand, as a consequence of which the volume of exports has always been superior to the volume of imported products, even though—and on account of insufficient cracking capacity in the refineries before 1958—the value of exported oils was at times lower than the value of imported gasoline and other distillates. Thirdly, proven reserves have been growing for the last 11 years at a higher rate than the rate of growth of domestic consumption.

Furthermore, from 1943 up to 1960, the average yearly production of crude plus condensate has increased at a rate of 6.8% (not 3%), as can be verified by a simple calculation:

$$Y_n = Y_o\ (1 + X)^n$$

where, n = number of years = 17

Y_o = production in 1943 = 35,459,000 barrels

Y_n = production in 1960 = 108,772,000 barrels

X = rate of growth per year

Therefore, X = 6.8%

Likewise, the production growth of natural gas during the same period has been magnificent: 16% per annum (from 23,850 million cubic feet in 1943, to 341,265 million cubic feet in 1960), and it must not be forgotten that 6,000 cubic feet of dry gas produce approximately the same number of calories as one barrel of fuel oil, so that given the necessary means of transportation, as for example the gas line from Ciudad Pemex to Mexico City, surplus residual oils can be cracked even down to coke, as will be done on the Pacific Coast in order to produce additional light and middle distillates. Of course, this will require "visible, imposing structures" within the refineries and hydrogenation facilities to remove the sulphur from the products; or else, the residual oils would have to be exported, probably through the "Brownsville loophole," or the gas burnt through beautiful and imposing flares into the atmosphere.

MEXICO—REFINERY RUNS AND FINISHED PRODUCTS OBTAINED DURING 1960
(Barrels)

Crude and other stocks charged	107,279,435
Refinery production:	
Motor gasoline	27,390,797
Aviation gasoline	413,628
Tractor fuel	1,893,860
Kerosine	8,931,075
Aviation turbine (Jet)	175,885
Diesel—gas oils	13,024,432
Fuel oil & residues	42,136,422
Asphalt	1,900,949
Lubricating oils & greases	1,081,680
Paraffins	320,508
Liquefied gas & other gases	5,095,288
Miscellaneous products	24,737
	102,389,261
Losses	4,890,174
Total	107,279,435

Source: Petroleos Mexicanos.

Total Mexican consumption grows at a high rate; now at about 290,000 barrels per day of liquid hydrocarbons it is almost 5 times greater than it was 23 years ago, apart from the fact that, in addition, natural gas is being consumed at present at the rate of 380 million cubic feet per day. But the demand for light and intermediate distillates is advancing much more rapidly than the demand for fuel oil. Whereas in 1938 the requirements of fuel oil amounted to 72% of the total domestic consumption of major products, it now represents only 35%. This disproportionate growth, combined with the predominance of heavy crudes, results in a perennial effort to increase the yields of lighter products. Hence the need for a continually increasing cracking capacity.

During 1956 and 1957 the refineries were not only short of "imposing structures," but were also short of cracking facilities, which resulted in increasing exports of residual oils and unusual imports of gasoline. Fortunately, and thanks to the excellent credit of Petroleos Mexicanos abroad, and in particular its credit with United States manufacturers, in 1958 the pattern of refinery

Petrochemical construction includes plants for the production of anhydrous ammonia, such as this plant at Minatitlan.

MEXICO—GROSS CONSUMPTION OF CRUDE OIL AND PETROLEUM PRODUCTS DURING 1960
(Barrels)

	PEMEX SALES					
	Domestic Production	Imported Products	Total Sales	Private Imports	Pemex Consumption & Losses	Gross Consumption
Gasoline (1)	26.015.235	2.527.956	28.543.191	779.745	477.281	29.800.217
Kerosine (2)	10.699.734	130.658	10.830.392	4.764	251.028	11.086.184
Diesel-gas oils	11.393.746	269.933	11.663.679	117.092	696.491	12.477.262
Fuel oil	28.297.797	510.140	28.807.937	182.517	7.012.007	36.002.461
Asphalt	1.869.132	45.302	1.914.434	271.475	139.524	2.325.433
Lubricating oils	902.836	23.303	926.139	92.628	81.883	1.100.650
Grease	27.742	898	28.640	25.364	791	54.795
Paraffins	296.009	1.287	297.296	171.054	11.800	480.150
Liquefied gas	3.972.358	153.977	4.126.335	2.509.316	902.396	7.538.047
Miscellaneous products	218.947	—	218.947	11.625	—	230.572
Crude oil	—	—	—	138	4.640.233	4.640.371
Totals	83.693.536	3.663.454	87.356.990	4.165.718	14.213.434	105.736.142
Natural Gas Mcf	74.732.969		74.732.969	11.313.196	41.563.942	127.610.107

(1) Includes aviation gasoline. (2) Includes tractor fuel & aviation turbine. Source: Petroleos Mexicanos.

output was back again in balance with domestic consumption.

The same editorial says that " . . . the temptation to overly concentrate on visible, imposing structures such as tiled refineries has been almost overpowering." What has been overwhelming is the temptation to meet the country's demand for oil products, but the low prices of such products which prevailed until recently (they are still on the average much lower than in the United States) coupled with high taxes paid by Petroleos Mexicanos to the government, denied the Mexican oil industry adequate earnings from which to provide for high continuous capital expenditures, even though the operating and maintenance costs of Petroleos Mexicanos compare favorably with those prevailing in the world petroleum industry. The timely and proportionate growth of the petroleum industry would be impaired if the prices of its products were to remain stationary while the costs of equipment, materials and services keep on rising not only in Mexico but in the rest of the world.

Petroleos Mexicanos has drafted definite projects to meet the required expansion of the refineries. The main problem is to obtain maximum net realization from crude oil and gas. This must be achieved with the minimum investment that provides the necessary capacity and flexibility of all units involved, so that yields may be varied according to the demand. The yields of light and middle distillates will have to increase constantly thus reducing the production of fuel oil, the shortage of which will be more than compensated by an abundant supply of natural gas. From an economic standpoint, the internal consumption of natural gas to liberate liquid fuels is far better than any imaginable scheme involving the sale of such gas abroad.

The program of expansion of the refineries that Petroleos Mexicanos is carrying through step by step, accompanied by a steady and successful development of crude oil and gas resources, will guarantee the supply of the nation's future demand for energy.

Manufacture Of Chemicals From Petroleum: Although the expression "petrochemical industry" has become broadly adopted when referring to an industry producing chemicals derived from petroleum and natural gas, and although in a strictly etymological sense it does not express what is intended, the meaning of "petrochemistry" should be restricted to the manufacture of such chemical products obtained from petroleum as should be produced for technical and economic reasons withn the limits of refineries or adjoining plants. A petroleum plant to produce propylene tetramer, an alkylation plant to combine this product with benzene and produce dodecilbenzene, the naptha reformers which produce such aromatics as benzene, toluene and xylenes, are typical examples of petrochemical units.

In other words, petrochemistry should be defined as a branch of the petroleum industry and, on the other hand, the manufacture of chemicals derived from oil and natural gas should be considered in its broadest sense as an integral part of the chemical industry.

In Mexico, although this distinction has not yet become generally accepted, the fact is that our legislation in this matter to a certain extent has observed it when marking the dividing lines between the two fields of activity in which the industry of chemicals derived from hydrocarbons should be developed: the field which is reserved exclusively for nationally owned industry (basic petrochemistry), and the other, which is far more ample and rightly belongs to the chemical industry, for private enterprises.

The chemical industry, both organic and inorganic, employs a wide range of raw materials. Sometimes different raw materials are used for the manufacture of the same product and although there are a number of factors governing the choice of the raw material which is utilized at any one time the economic factor is, generally speaking, the predominant one.

Although oil companies were the pioneers in the use of petroleum as a base material for chemicals, the established chemical companies were very quick to take advantage of this abundant new source of raw material for their industry, and they are now by far the largest consumers of oil products for chemical manufacture, accounting between them for about two-thirds of the total chemical production based on petroleum.

Evidently then, it is the chemical industry, and not the petroleum industry, that is simply using petroleum as a raw material to substitute others such as coal and vegetable products used for many years to obtain the same final chemicals, but the properties of these chemicals are naturally not in any way affected by the raw material from which they are derived.

A sizable local market is necessary before the manufacture of chemicals from petroleum can be justified economically. This market lies in the consuming industries. Plastic processing plants, rubber consuming plants, paint and lacquer manufacturers, etc., should be established first. When such industries are established, the next step in the development of a country's economy can be the local production of chemicals from petroleum, but capital investment is high and consequently its economics are very much dependent on the size of its activities.

Fortunately, Mexico has progressed to the point where it is able to satisfy these requirements, and the rate of growth of its economy fully justifies the initiation of a wide range of industries working with petroleum basic chemicals and transforming them into other chemicals or finished products.

The development of the chemical industry in Mexico, and in particular the manufacture of chemicals from petroleum, is based on certain important premises that the government and private enterprises have jointly established.

In accordance with the existing laws on the subject, certain basic products are to be manufactured by Petroleos Mexicanos or subsidiary undertakings under State control. The rest belong to the private sector even though there may be cases when the establishment of joint companies is advisable.

Although Petroleos Mexicanos will continue to take very strong and wide ranging initiatives, even with regard to industries that fall within the private sector, it will progressively withdraw from direct participation in those fields where private capital and initiative can and should take the strain. In Mexico, generally speaking, the State does not want to take the role of enterpriser but rather to help private endeavor in the task of transforming the economy of the country.

Economic Aspects: In the editorial mentioned before, there seems to be a slight fallacy because in the final paragraph it says that " . . . The tragedy (of Pemex) lies in the fact that the funds it invests are funds that the government is thereby deprived of for use in education, transportation and other governmental functions for which it is directly responsible. They are funds which would be readily obtained from private sources given the proper legal framework."

The capital expenditures of the Mexican petroleum industry are not provided by the government but are obtained from the sale

of products to the public and from exports. Furthermore, Petroleos Mexicanos pays taxes to the Federal Treasury at the rate of 12% of its gross income from sales; plus state and municipal taxes in proportion to its local operations. Last year the Federal Treasury received from Petroleos Mexicanos a total of 1,065,230,798.84 pesos. (About $85 million U.S.) Moreover, Pemex subsidizes certain sectors of the country's economy such as public transportation and other enterprises.

Thus, Petroleos Mexicanos is providing together with private industry, the development of which has largely been due to the abundant supply of low price fuels, the necessary funds that the government uses in education, transportation and other governmental functions. They are funds which would not be available if Mexico did not have a diversified economy and were to rely on exports of oil to purchase consumer goods from abroad, as happens in Venezuela. In Venezuela petroleum accounts for about 90% of its exports but employs less than 3% of its labor force; the majority of the people work in the interior for a precarious subsistence mainly in agriculture. An excess of expenditure over income, a balance of payments deficit, flight of funds, depleted exchange reserves, serious economic recession: these are the unhappy features of Venezuela's economic situation today, which the Betancourt government is making valiant efforts to remove.

If through the application of capital and increased productivity the domestic economy were to grow so that people working primarily on the land alone would now supply each other with clothing, footwear, houses and house furnishings, as well as food products, even though exports of petroleum were to be slightly reduced and home consumption increased, nothing but gain would result to the inhabitants without any loss to the foreign companies established in Venezuela or to the outside world. No doubt there would be a fall in the proportion of foreign trade to national income. But could it not be that this proportion in the many countries of this type has been kept unduly high in the past simply by the poverty of the domestic economy? World income is a more basic criterion of world prosperity than international trade.

An economy based mainly in agriculture and extraction is not only a dependent economy but an unstable one. Its fortunes depend on the fluctuations of foreign demand by the very limited range of goods that it produces, and experience shows that such fluctuations are liable to be violent, giving rise to unpredictable changes in the size of the national income from year to year and to an ever present menace of large scale unemployment.

Mexico, with all its problems, is enjoying a period of economic expansion. Both industrial and to some extent agricultural production are increasing rapidly and a considerable proportion of the revenue is being spent on developments urgently needed to cope with a population rising by about 3% per annum. But a rapidly expanding economy naturally implies a correspondingly quick growth in the demand for energy: and, since coal is scarce and hydroelectric power is limited, over 90% of the energy consumed in Mexico has to be supplied by the petroleum industry.

The task which befell Petroleos Mexicanos of expanding crude production and refining has been accompanied by a continually rising home consumption, but satisfying this demand has been the more exacting because local prices of petroleum products still remain at levels much below true economic worth if measured in relation to other economic factors.

To give an example, between the years 1939 to 1960 the general retail price index for all articles in Mexico rose from 100 to 1117. During the same period, the price index for products sold by Pemex rose from 100 to 334. Applying the general index to the volume of oil products sold each year and deducting the income actually obtained by Pemex, there is a difference of 80.965 billion pesos over the period mentioned.

In other words, by not raising the prices of oil products in line with those of other consumer goods, the national petroleum industry allowed the consumers to retain nearly 81 billion pesos. (About $7.5 million U.S., considering different rates of exchange during the period.)

Unquestionably, a great part of this amount found its way into the new industries which have so greatly increased in recent years the gross national product and have transformed Mexico into a moderately industrialized country. Besides, these new industries have increased year after year the country's revenue, and as a consequence the state has been able to develop irrigation schemes, transportation systems, educational facilities and other typical government functions; social improvement has been very considerable and the standard of living of the population is steadily rising.

The future of private industry and agricultural production depends upon the healthy and rapid economic development of the country or countries in which it operates. This implies accepting that where the public sector has an important contribution to make towards stimulating economic growth, as is the case with Petroleos Mexicanos, it must not be regarded as "dangerous" in the mistaken belief that any extension of economic activity is necessarily inimical to private enterprise.

END

MEXICO'S OIL POSITION

The following letter to the editor presents a more optimistic view of Petroleos Mexicanos' situation than that contained in World Petroleum's editorial of last June. It is presented here in its entirety.

Dear Sir:

I have just finished reading the June, 1961 edition of *World Petroleum*, in which you discuss the Mexican petroleum industry. The articles are well done and present a fair perspective of Petroleos Mexicanos. I would, however, like to make some comments about your editorial which, on the whole, is fair and makes some good points. But the last paragraphs are, in my opinion, quite misleading.

It happens that I have recently made a comprehensive study of Pemex with the objective of obtaining long term financing. As a petroleum engineer and petroleum economist with many years experience, I would like to correct the record concerning the last two paragraphs of your editorial. Here you state that the production cushion has shrunk. This does not appear to be so, either from my studies or these of Pemex.

The forecast of 6½ per cent annual increase in demand by Pemex is for all hydrocarbons, including natural gas. Since oil and gas account for about 94 per cent of all energy consumption in Mexico, the growth rate is about three times that for the United States. But the actual growth in demand for petroleum is much less because, just as in the United States, natural gas has been displacing crude oil rapidly. From a level of only several per cent of total demand in 1950, natural gas now accounts for the equivalent of over 50,000 b/d, or 15 per cent of total energy consumption. With the completion of the natural gas pipeline fro mthe Isthmus of Tehuantepec to Mexico City a few months ago, another 30,000 b/d of fuel oil has been displaced by natural gas. By 1965, natural gas will account for more than 25 per cent of total energy consumption, which is about the same ratio as in the United States.

Thus it is that the growth in crude oil production in Mexico will only be that which the domestic market needs, or about 3 per cent per annum. As a matter of fact, the reserves in Mexico are stated by the company to be around 2,750,000,000 barrels which, at their current rate of production, shows an indicated life of 27 years, about twice that of the United States. To my knowledge, there are at least 50,000 b/d of shut-in production, much of it heavy oil of course, but nevertheless available for either export or refinery throughput. The record with respect to natural gas is even more impressive since Pemex now has reserves of around 10 trillion cubic feet (a threefold increase in only ten years), with an indicated life of nearly 30 years, as compared with 20 in the United States.

Thus, your editorial is very misleading with respect to the ability of Pemex to meet the anticipated growth in demand for crude oil and natural gas. As a matter of fact, my study indicated that they could satisfy the anticipated growth in demand for both oil and gas for the next four or five years with little development drilling.

Your comments about the shortage of capital, however, are well taken, and the company has not had the ability to raise long-term funds, which remains their most urgent need. A company of this size in the United States could have $500 million of 20-year, 5 per cent debentures outstanding and still have a reasonable capitalization. But in the case of Pemex, there are no long-term funds available in Mexico, and political risks make it impracticable to raise any long-term money outside of Mexico, without guarantees of some sort by International agencies.

I would appreciate it very much if this letter could be published somewhere in the next edition of your magazine to set the record straight.

Very truly yours,
Kenneth E. Hill, Partner
Eastman Dillon, Union
Securities & Co.

Russia's Oil Drive

GORDON W. REED is chairman of Texas Gulf Producing Co. His Houston-based independent company has interests in Libya where it shares equally with Standard Oil Co. (New Jersey) in exploitation of the Esso (Sirte) acreage. Promising discoveries by Esso (Sirte) there stimulated Mr. Reed's interest in the Russian oil threat, and he brings to bear a view from other industries with which he has been associated. His article is taken here from a recent speech to the American-Arab Association for Commerce and Industry, Inc., of which he is president.

by Gordon W. Reed

Russian oil exports only amount to a fraction of the total international crude market but that fraction is a disturbing one. Russian sales have upset the market and threaten to wreck the international crude price structure if action by consuming nations is not forthcoming

WHEN ONE TALKS about Russian oil one must talk about the Russians. It is fruitless to discuss what we think of the Russians but what is important is what the Russians think of us. I have cast about for an informative source and found George Kennan's book, "Russia and the West under Lenin and Stalin" to be a good one. His years in Russia as a United States government official, and later Ambassador, have indicated to him, their opinion of the western governments:

"We despise you. We consider that you should be swept from the earth as governments and physically destroyed as individuals. We reserve the right, in our private if not in our official capacities, to do what we can to bring this about: to revile you publicly, to do everything within our power to detach your own people from their loyalty to you and their confidence in you, to subvert your armed forces, and to work for your downfall in favor of a Communist dictatorship. But since we are not strong enough to destroy you today—since an interval must unfortunately elapse before we can give you the *coup de grace*—we want you during this interval to trade with us; we want you to finance us; we want you to give us the advantages of full-fledged diplomatic recognition, just as you accord these advantages to one another."

"An outrageous demand? Perhaps. But you will accept it nevertheless. You will accept it because you are not free agents, because you are slaves to your own capitalistic appetites, because when profit is involved, you have no pride, no principles, no honor. In the blindness that characterizes declining and perishing classes, you will wink at our efforts to destroy you, you will compete with one another for our favor. Driven by this competition, which you cannot escape, you will do what we want you to do until such time as we are ready to make an end of you. It is, in fact, *you* who will, through your own cupidity, give *us* the means wherewith to destroy you."[1]

The Russians think of themselves as symbolizing a modern Robin Hood who "takes from the rich and gives to the poor," but in the case of oil exports the effect is "to take from the poor and give to the rich." The Russian oil price level causes

[1] "Russia and the West under Lenin and Stalin" by George F. Kennan; Little, Brown and Company, Boston and Toronto, 1960, pp. 184, 185.

competitive price reductions in the poor Arab countries and the benefits are passed on to the richer countries of Europe such as Germany, Sweden and Italy.

The operations of a competitive economic system mean that even 3% or 4% of low priced crude oil causes the entire price level to decline. When Russian imports reach 9% as they do in Germany, 15% in Sweden and 21% in Italy, the entire price level tumbles to the Russian level.

The main countries concerned are West Germany, Italy and Sweden and in general there is a tie-in for steel pipe, pumps and, in general, equipment to hasten Russian pipeline construction and refining facilities.

West Germany imported 57,000 barrels crude and products per day of Russian oil in 1960—9% of her total demand at a price of about 30% under the price paid by satellite Czechoslovakia. German steel companies shipped pipe and equipment to Russia. Offhand this looks like a good deal for West Germany until we realize that the West German refining and distributing industry is losing large sums of money—surely greater than the steel profit—due to the destructive price level set by Russian dumping. Competitive history indicates that when a 9% segment of the refining industry obtains a price advantage that all refined prices collapse and profits tend to disappear. The West German refining and distributing complex has a capital value of some $1,500,000,000 which is paying virtually no income taxes due to lack of earnings and, in effect, the entire refining industry and the West German government are subsidizing a small portion of the West German steel industry. West Germany as a whole will lose more than she gains.

We face the ironic situation that a socialist nation in competing with the West resorts to the most abusive of cartel practices—"Keep the price down to drive out competition and when you get market control—raise prices."

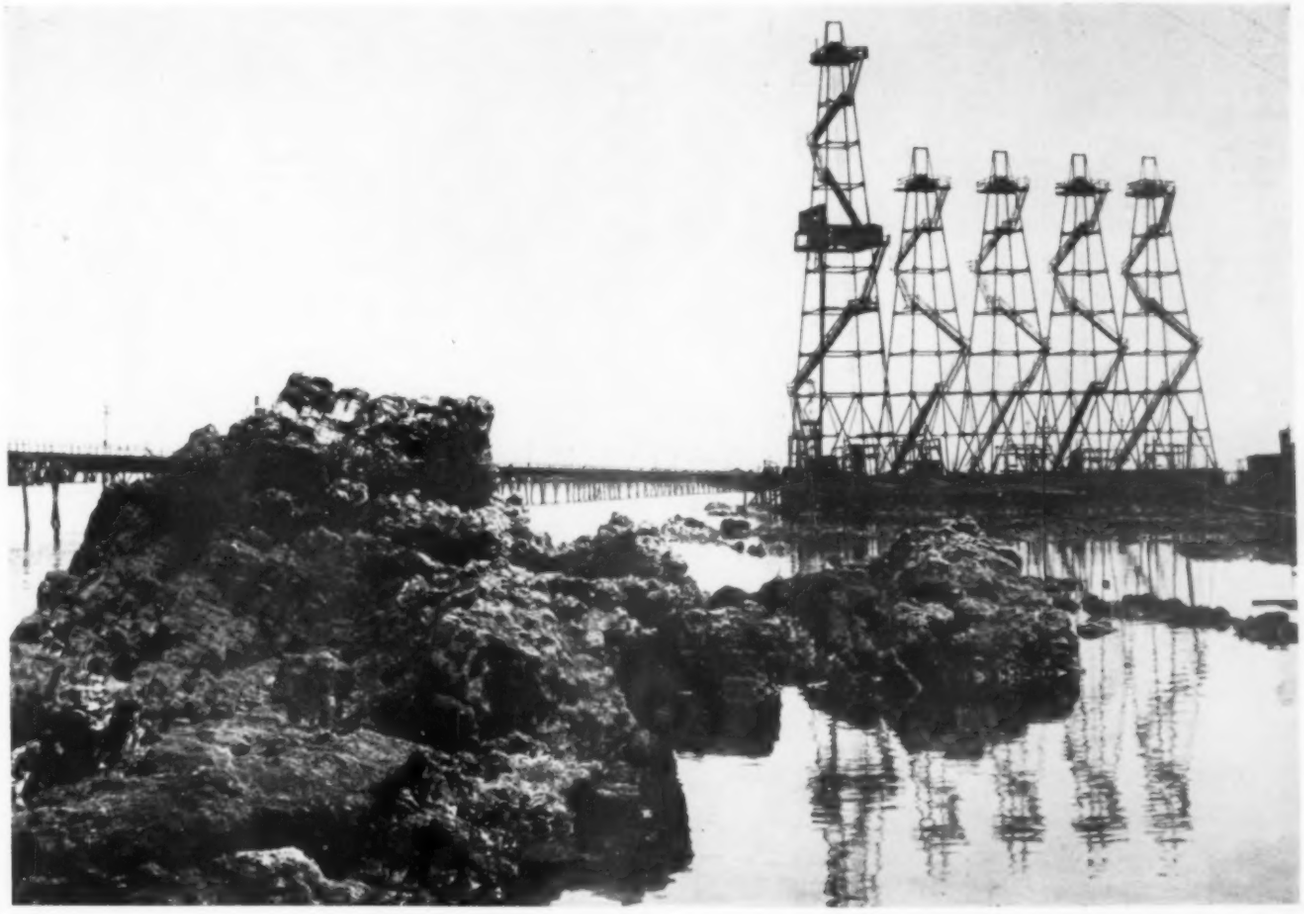
The same comparison holds for Italy where Russian oil prices equalized at the Persian Gulf are 75¢ a barrel, or less than the royalties and taxes paid to the Arab producing countries. Twenty-one per cent of the Italian demand comes from Russia.

It would seem that Germany and Italy should not only control this destructive

RUSSIAN OIL EXPORTS—MAY 1961

Barrels per day: Total Demand	Country	Imports from Russia (crude and products)	Total Imports from satellite countries (incl. Russia)	% Demand	Price
630,000	Germany	34,000	57,000	9	—30% of Czechoslovakia price
470,000	Italy	96,000	96,000	21	50% of Persian Gulf price
46,000	Finland	40,000	40,000	87	+50% of price to Sweden
250,000	Sweden	35,000	37,000	15	Mostly fuel oil
56,000	Austria	2,000	9,000	16	
71,000	Norway	4,000	6,000	8	
242,000	Holland	1,000	1,000	—	
152,000	Belgium	4,000	8,000	6	
106,000	Denmark	2,000	2,000	2	
942,000	United Kingdom	4,000	4,000	—	
600,000	France	16,000	25,000	4	
8,000	Iceland	8,000	8,000	100	
44,000	Greece	10,000	10,000	23	
90,000	Egypt	30,000	30,000	34	

Russian rigs during the early offshore days.



Skilled Russian oil driller, M. Kaverochkin, beside "Neftyanye Kamny" field's first well.

action but develop a quota apparatus to handle the Russians if they later decide to make, for example, cheap Volkswagens and possibly sell them at dump prices in West Germany itself. Cheap oil now means high priced oil later if the Russians ever get control.

In Sweden the Russians are selling fuel oil at dump prices to big power plants and of course ruining the Swedish refining industry and again the refining industry is underwriting the power industry.

The remedy is to put a country by country percentage limitation on Russian imports the same way the U. S. A. did on all crude and product imports (roughly 15% of the total demand). If the Russians were limited in volume on a country by country basis, they would quickly bring their prices up to a competitive level. We should deal with Russia on a quota basis as all dealings are with one party—the government—and the modus operandi is simple.

The Arab countries are increasingly aware of this threat to them and I think the time is ripe for an Arab revolt to avoid another Persian Gulf price cut. By dumping raw materials, Russia is competing with the only export the undeveloped countries have.

The Russian oil producing industry is not to be compared in efficiency or low cost with the Persian Gulf area and their location is far from deep water for cheap transportation. The average production of Russian wells is 80 barrels a day and the average in the Persian Gulf is over 3,000 barrels a day. Thus there is no economic background for low Russian prices but mainly a political one. Most countries have anti-dumping laws which are extremely flexible and little understood or used, but at least there is a background which, in general, states that if a country sells products ouside of its country cheaper than it does within its own country, that the difference constitutes dumping and the remedy is either a percentage limitation or a tax equal to the value of the dumping charge, the tax to be collected by the importing country.

Russia maintains artificially high prices where she is in military control such as Poland, Czechoslovakia, East Germany, Hungary, etc. According to all the rights of reciprocity, the Persian Gulf producing countries should have access to this high priced crude oil consuming area in Eastern Europe whereas they are now kept out by the one-way nature of Russian trade.

A typical case of how the Russians can be handled once the initiative is taken from them is in the diamond business. Russia discovered diamonds several years ago and started to put them out on the world market, of course, at depressed prices. They very soon found that they were not selling them in satisfactory quantities due to the united efforts of the diamond merchants who throughout the world are well organized by the deBeers syndicate. After a short period of experimenting, Russia came into camp and now gets her proportion of the world diamond market at the deBeers level. Actually Russia is receiving more money in this manner but does not have the satisfaction of upsetting economies.

This problem of control could be handled vertically, industry by industry, or horizontally by the governments involved. The government method is the better as it would create an apparatus to handle any dumping or singling out of a product or country as the need arises.

This is largely an alliance problem. Just as the NATO military alliance has prevented Russia militarily from doing what Hitler did in taking on one country at a time—an economic alliance would perform a similar mission—bloodlessly.

The West should use its present enormous economic and banking power to keep these Russian forays to a reasonable price level. How would Russia function internationally if the West's banking exchange and credit resources were denied? Russia would have to use gold and would use up her supply in a short time. Last year Russia sold $200,000,000 of gold to the West at $35.00 an ounce. If Russia wants to dump, let her dump gold which would harm Russia and strengthen the western banking system.

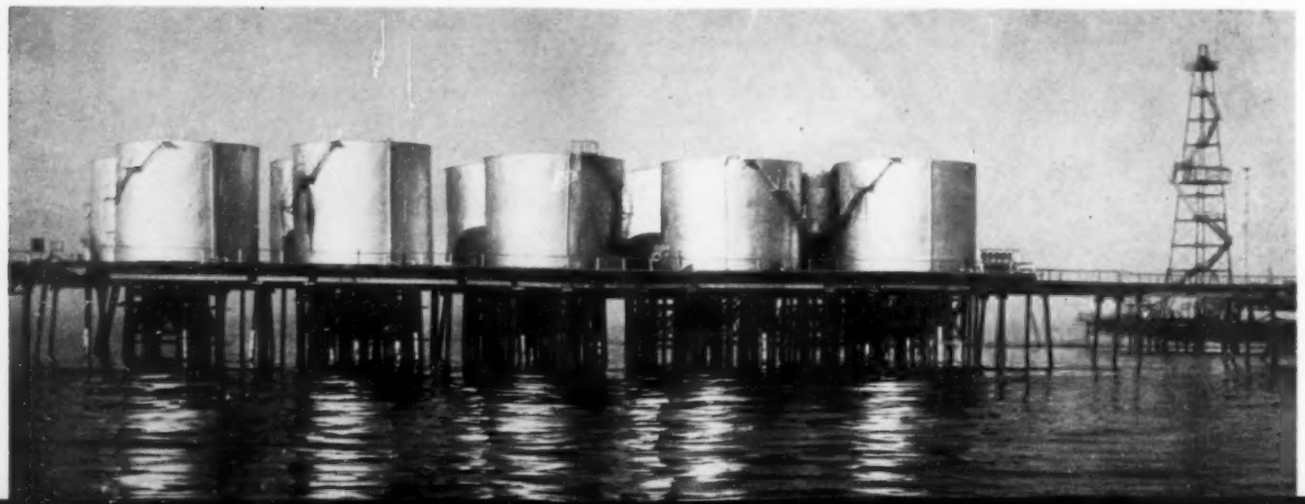
As a result of the tremendous raw material expansion in 1941-1945 and 1950-1952, there is a world glut of all raw materials which is largely Russia's source of foreign exchange. Why not have the reckoning now instead of during a period of shortage, such as 1965 or so?

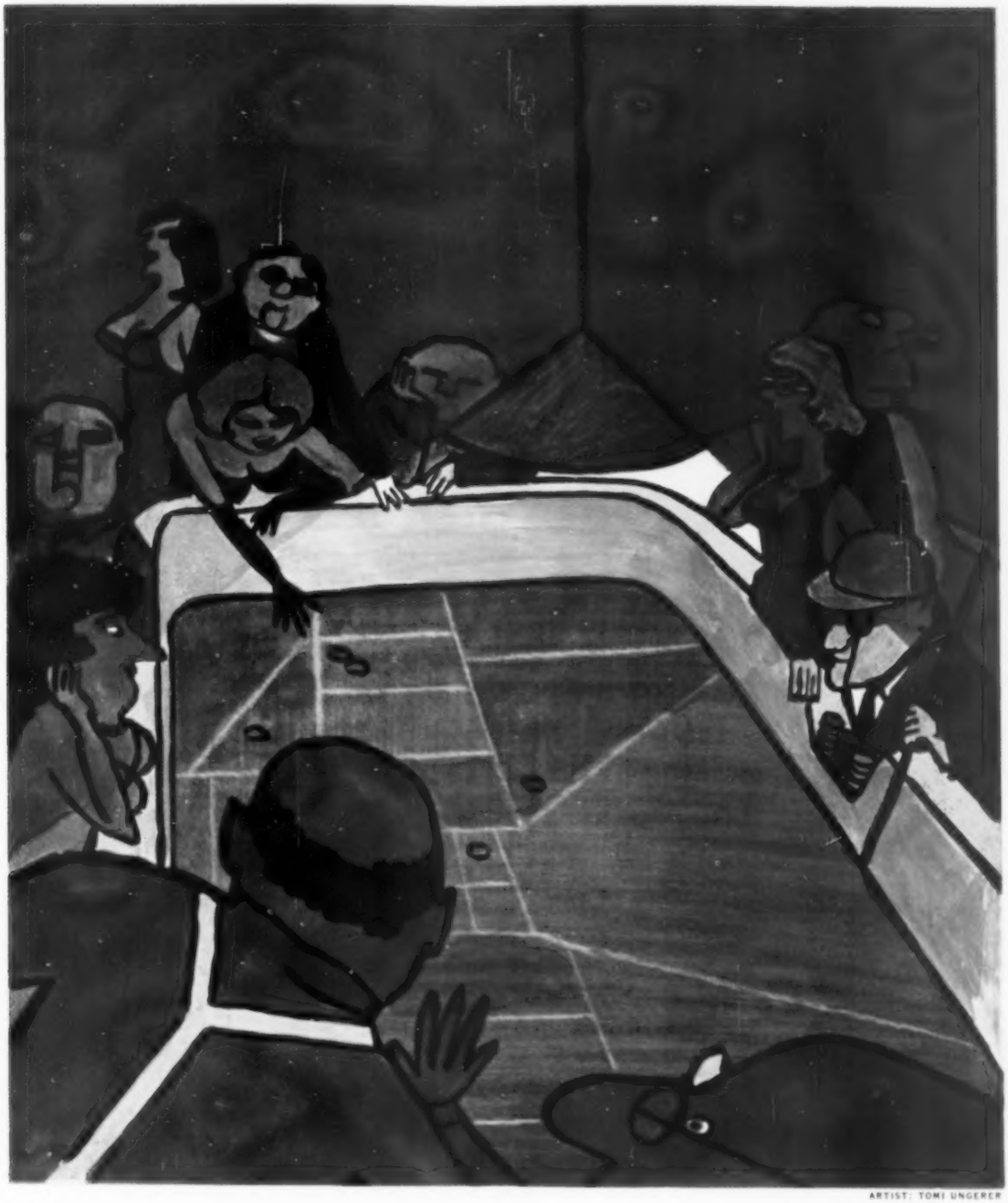
This Russian oil effort makes her extremely vulnerable. It enables the West to (1) take the Arabs' side and (2) point out one cause for the low standard of living in the satellite countries—when the Russian army is in control, prices go up.

To the extent that Russia exports fuel oil she has a refining balance problem. What happens to the gasoline? Russia is not a gasoline economy and gasoline can't be readily shipped to Western European countries due to special handling problems. Russia is short of fuel oil herself which is the main reason she is in such haste to build natural gas lines. Maybe one day the western fuel oil customers will quickly find they need another source of fuel supply.

We should capitalize on the fact that Russian foreign exchange comes largely from raw materials in excess supply. If Russia chooses to sell at dump prices, a quota limitation in the case of oil should be placed on her shipments to protect the Arabs. The price rather than the volume of Russian oil shipments is the most disturbing factor. A table of Russian oil shipments to various markets is appended. END

Soviet oil tanks on the Caspian Sea.





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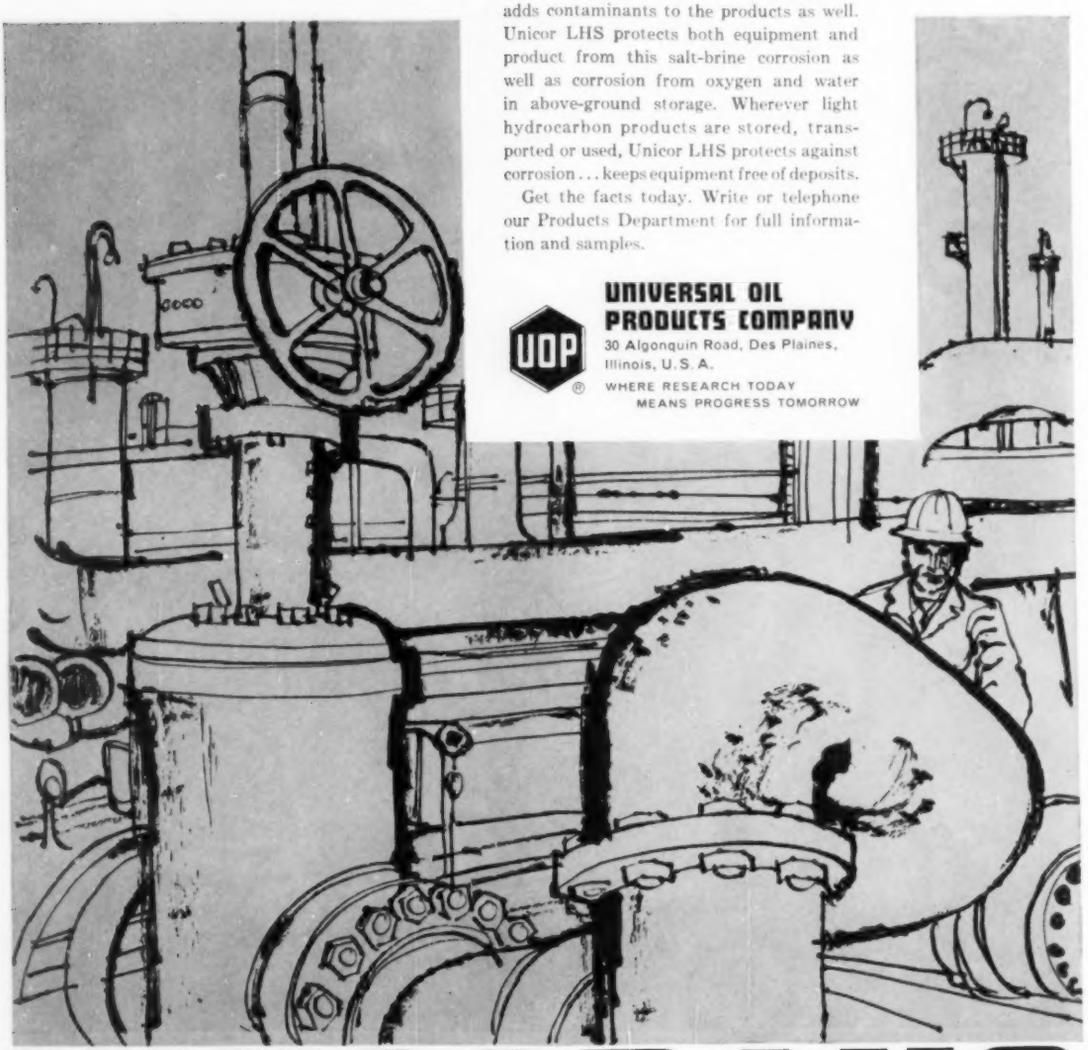

UNICOR LHS

Future of Russian Oil

Russian oil exports will rise to 1,000,000 barrels daily by 1970

Steel trestles of the "Artemneft" oil field in Azerbaijan S.S.R. (Sovfoto)

THE RUSSIAN OIL EXPORT drive has continued to gain momentum. Looking ahead, there is visible up the road the specter of a giant pipeline which points directly at the industrial heart of Europe with completion only a few years away. With it goes growing tanker fleet and a need for revenues from oil export that is growing daily stronger.

Given these aspects of the Russian scene, what lies ahead? It is a delicate subject, on which WORLD PETROLEUM has solicited opinion from leading figures in the international oil business. K. S. Adams, chairman and chief executive officer for Phillips Petroleum Company, has this to say:

"The U. S. oil delegation which visited the Soviet Union in 1960 learned that the Russians were constructing a crude oil pipeline from fields in the Volga-Ural Mountains area to the Baltic Sea, with branch lines into Poland and East Germany. The size of these lines indicated that substantial volume of crude could be transported easily and quickly into the Free World.

"There was also definite indication, since shown by actions, that the Russians were willing to base their crude prices solely on political considerations rather than on the usual competitive economic factors of world markets. Already, the Soviets have exported petroleum beyond the Iron Curtain at prices which in some instances are below the costs of producers of Free World crude. This is despite the fact that the Soviets use significantly more manpower and materials to produce their crude.

"Large-scale export of Russian oil based on political advantages rather than realistic economic factors could create a grave situation in world crude markets. With particular respect to Britain, barter imports of Russian crude would place its own oil reserves in the Middle East, a mainstay of its economy, at a serious disadvantage. I hope that none of the countries of Western Europe will lend support to trades in which Soviet crude oil becomes barter stock to determine the economy of the Free World and aid Communist Russia's political warfare.

"This is a vital issue. Russia is exporting oil on a political price basis primarily as a powerful weapon in the cold war and not merely as an economic tool."

As a result, Soviet export capacity is estimated by WORLD PETROLEUM to rise to about 1,200,000 b/d in 1970 from 600,000 b/d in 1965. Thus, they leave about 800,000 b/d to be exported to the Free World in 1965 and 1,000,000 b/d in 1970.

Where will this oil come from? It is generally considered that about half will come via the new COMECON pipeline which is now under construction, and the remainder via tanker from the Black Sea. From the COMECON line the following quantities

View of Comecon pipeline, 28" in diameter, laid 6½ feet underground. The line will extend from the Volga River 2,315 miles to Europe. There will be 13 pumping stations

are expected to flow in 1970 via the countries or area indicated:

ESTIMATED RUSSIAN CRUDE EXPORTS VIA COMECON—1970
(Barrels Daily)

Baltic	240,000
Czechoslovkia	110,000
East Germany	100,000
Poland	100,000
Hungary	40,000
TOTAL	590,000

Additionally, there will be exports via the Black Sea to be reckoned with. These are estimated in 1970 to amount to about 610,000 b/d, of which about 50,000 b/d will go to Communist China and the remaining 560,000 b/d to the Free World. There seem adequate Soviet tankers for this purpose, especially in view of the available tankerage on the market today which private owners seem willing to charter for carrying Soviet oil.

There seems little doubt about Mr. Adams' implication that Soviet exports of crude petroleum will increase. The current Seven Year Plan (1958 to 1965) will have boosted crude oil production to about 4,800,000 b/d, over half that of the United States by its end. The general opinion of most observers is that the Soviets will meet these plan objectives with ease, and carry them on through the next seven year plan to raise production to about U. S. levels by 1972, that is to the neighborhood of 7,000,000 to 8,000,000 b/d.

Given these rates of production, the question arises as to what amount of this production will have to be consumed at home. The rise in consumption within the past decade has been in the neighborhood of 13% annually. It may decline slightly, and is expected to average about 11% yearly rise during the 1960's.

These are high consumption rates (several times faster than U. S. rates of consumption increase) but they seem compatible with the USSR's avowed objective of supplying 38 to 40% of its internal energy demand in 1970 with oil, as compared with 26% in 1958. Also, it matches fairly with the 9% projected annual increase in industrial production which is programmed.

They would result in a consumption level within Russia of about 3,900,000 b/d in 1965, and about 6,600,000 b/d in 1970.

Where will this oil flow? The predictability of Soviet oil destinations is low, but available information permits the projection of current Soviet oil arrangements through 1965 as given in the accompanying table.

USSR—DESTINATION OF OIL EXPORTS 1965

Country of Destination	1,000 b/d	Percent of Inland Demand
Austria	12	18
Belgium	13	6
Denmark	7	5
Finland	71	100
France	—	—
Greece	12	24
Iceland	9	100
Italy	135	25
Norway	7	10
Spain	15	10
Sweden	54	18
U. K.	10	1
West Germany	61	7
Yugoslavia	16	48
Ceylon	6	35
India	50	23
Japan	65	7
Egypt	54	53
Lebanon	—	—
Syria	17	59
Morocco	2	10
Argentina	19	5
Brazil	—	—
Cuba	108	100
Uruguay	14	45
Other	43	—

Secretary Stewart L. Udall had the following to say before a meeting of the American Petroleum Institute on July 27, 1961:

"From a relatively modest beginning in the early 50's Soviet exports to non-bloc countries have assumed major proportions in the past two years. These exports to non-bloc destinations currently exceed one-half million b/d.

"There are some limiting factors affecting Soviet expansion. Policies of some potential importing countries are being designed to minimize oil imports from the Soviet. The shortage of transportation facilities has been a limiting factor on the growth of oil consumption in the USSR. It is significant that a major share of the increases in energy consumption in the Soviet Union is going to oil, thus reducing availability for export.

"The weight of opinion, however, is that the Soviet export effort will be expanded. New oilfields are being developed, and new transportation facilities are under way. A pipeline network that could significantly expand exports is now under construction. The nucleus of an expanded tanker fleet is being assembled. Taking all of these factors into account, I would unhesitatingly predict a doubling of Soviet exports over the next four to five years.

"From the standpoint of sheer volume the quantities of oil now being exported from the Soviet bloc are not of major significance. Because of the ability of the USSR to exercise a degree of price flexibility, however, and because of its ability to concentrate exports into selected markets, present levels of exports are already having an effect disproportionate to their quantity.

"In this connection I think it is well to bear in mind that Russian oil held an important position in Europe prior to World War II and there is every indication that the Soviet Government is now intent on a program designed to regain its share—and more—of the European market.

"It is apparent from the experience of the past three or four years that the flexibility of the Soviets in terms of price makes it most difficult to resist the 'bargain counter' offers of the Soviets. Further, there is a fundamental difference between Soviet marketing tactics and tactical alternatives available to private companies. It seems reasonable, however, to assume that the Governments involved will not lose sight of the underlying realities of Soviet economics, and will view long-term commitments with a healthy skepticism.

"Soviet oil has its greatest competitive advantage in a situation where a country has

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USSR—Estimated 1965 throughput capacity for Batumi and Siberian Lines

surplus capacity for production of capital goods—or of a raw material basic to its export economy. These two factors, I believe, raise fundamental questions.

"In the first place, it seems plain that means should be found to increase the *stability* of prices and markets for those raw materials which are vital to the economies of under-developed nations.

"Broader use could be made of commodity arrangements to accomplish this purpose and certainly industrial nations should develop a more complete and sympathetic understanding of the position and problems of raw materials exporting nations.

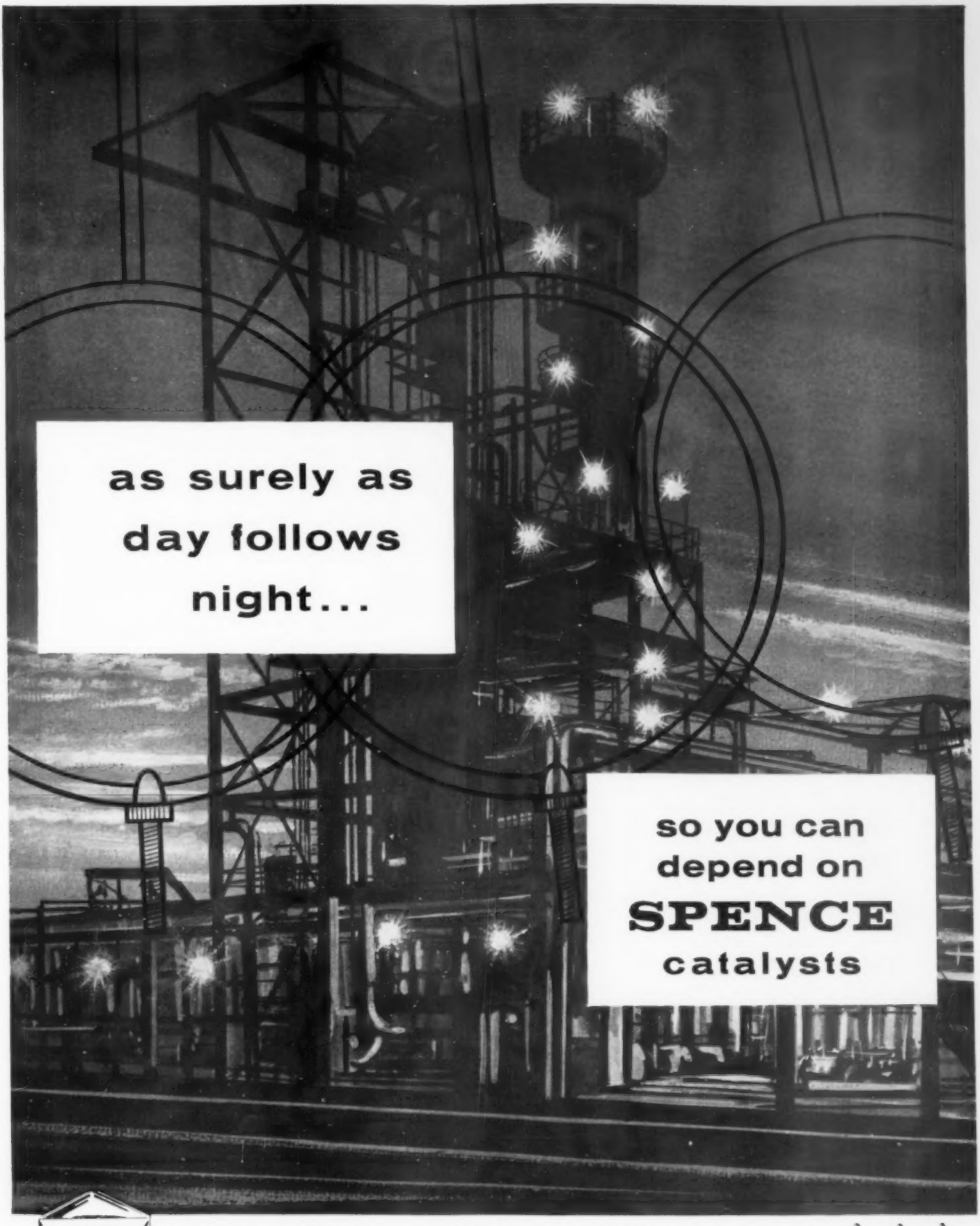
"The second major temptation, the gains that stem from exchanging a surplus of fabricated goods for Russian oil, poses a somewhat less complex problem. The desire of industrialized nations to exchange their surpluses for Russian oil on advantageous terms is readily understandable. It seems to me, however, that the next stage in these arrangements, that is, the *constuction* of capital facilities to service the Russian trade carries with a reliance on a market which is uncertain at best. *Obviously, Russian oil is cheap only when it is in the interests of the Soviet Government to have it so.* The terms of trade can shift rapidly and arbitrarily and before any nation predicates even a portion of its industrial growth on a continuation of this trade it should consider most carefully the implications of the resultant dependency.

"The ability of the Soviet Government rapidly to amend its terms of trade brings to focus another questionable element involved in reliance on the Soviet Union as a basic source of petroleum supplies. We are informed that the processing of Soviet oil requires some capital changes in many processing facilities because of contaminants present in the oil. Major capital expenditures either in processing or burning equipment based on the current availability and price relationships of Russian oil could prove to be extremely wasteful of vital resources.

"Finally, importers and potential importers of the Soviet oil must consider the implications of dependence on this source in the event of military emergencies of any kind. It is in this area, where the stakes are high and the risks are great, that Soviet oil raises the most compelling questions. It is here that each nation involved must search its national conscience in an attempt to achieve a balance between the immediate advantages and the long-term risks.

"Soviet oil, while an important and pressing issue, is only one of many problems that arise almost daily in the Department's dealings with petroleum. The complexity of the issues involved, it seems to me, requires even closer cooperation than now exists between the domestic petroleum industry and the United States government."

The statement by Secretary Udall indicates a growing concern on the part of the United States and its partner governments in Free World alliances over this problem of Russian oil exports. The oil companies themselves are caught on the horns of a dilemma: they cannot lower prices to meet Soviet price competition without incurring the wrath of the producer governments which look with disfavor on any price cutting; they cannot combine nor act in concert to meet the threat due to anti-trust legislation, and that effectively hamstrings their efforts. Any action taken would appear to have international implications that preclude the oil companies themselves from effectively meeting the threat. This leaves it up to the importing countries themselves. There is reason to suspect that they will act with caution, having full knowledge of the political strings attached to Soviet oil and the need for reliability as complete as it can possibly get in a continuing dependable oil supply. END



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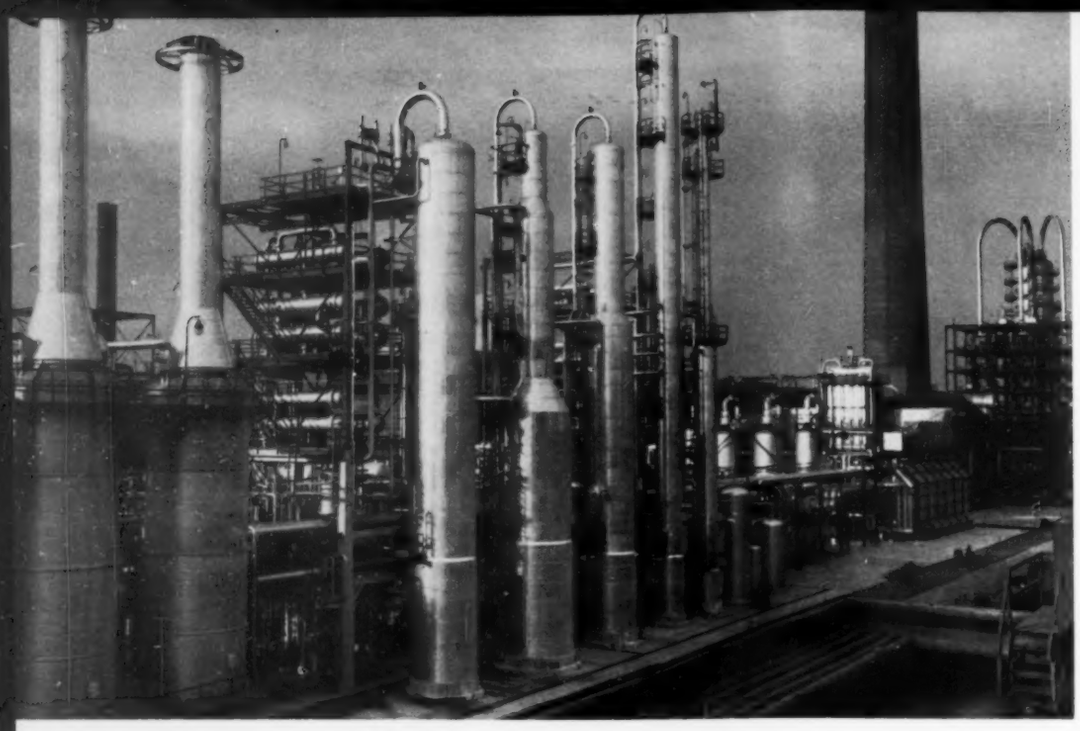


Gelsenkirchen refinery of Gelsenberg Benzin AG, showing platforming unit

Refining capacity continues growth in West Germany

by Alfred M. Stahmer

WESTERN GERMANY is on the threshold of a third and fourth period of refinery expansion in the post-war era. While the indigenous oil consumption has been increasing for several years at an extraordinary average of roughly 25% annually, the oil companies—those traditionally in the German market as well as several newcomers—are busy projecting new refining capacities close to the consumption centers.

The first stage of refinery expansion, completed in the mid-50's, involved rebuilding and enlarging the war-bombed plants on the North Sea coast at Hamburg, Bremen, and Heide; converting the coal hydrogenation plants in the Rhine-Ruhr district to crude oil; rebuilding the Misburg refinery near Hanover; and erection of a new plant at Lingen (Emsland).

During the past three years a second period of expansion was finished, with the result that the center of refining activities shifted from Hamburg to the Rhine-Ruhr district, where leading marketers built new works at Cologne, Godorf, Dinslaken and Duisburg. Several existing plants were considerably enlarged, and new crude pipelines were put on stream from Wilhelmshaven to Wesseling near Cologne as well as from Rotterdam to the same place. On their way, these lines feed nine refineries.

Following a general lull in capacity increase this year and next, the years 1963 and 1964 will see third and fourth centers for Western German refining growing: first, on the Upper Rhine at Karlsruhe and Frankfort, and then in the middle of Bavaria at Ingolstadt, as well as in the area between Ingolstadt and Regensburg.

The interval between the third and fourth expansion periods will probably be relatively short, for this reason. The refineries at Karlsruhe are on a long-term planning basis, coordinated with the building of the Marseilles pipeline to Strasbourg and Karlsruhe. The filing of further refinery projects in Bavaria was hastened by the announcement of Enrico Mattei, president of the Italian Ente Nazionale Idrocarburi, to start refining in Bavaria. Mattei's aim is to enter the German market on a large scale from a side where his competitors up to now have not had plants.

The basis for this rapid development is the ever-growing demand, which was 23.8 million tons plus 1.8 million tons of bunker oil in 1959, and increased to 29.8 million tons plus 2.3 million tons in 1960 (including the refineries' own consumption). Up to 1965 a further rise to about 46 million tons plus 2.4 million tons of bunker oil is estimated. Of this, more than 25 million tons might be fuel oil, about 8.5 million motor gasoline and 5.7 million diesel oil.

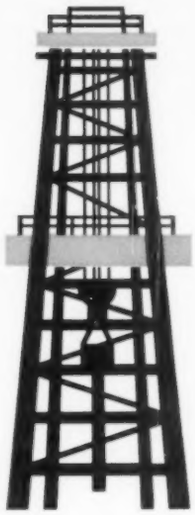
In the light of these figures and the fact that the nation has a considerable export business (2.8 million tons of products in 1960) the present refining capacity of 40.4 million tons apparently cannot be regarded too large.

The forecast of the Association of West German Refineries indicates a total 1961 throughput of 35 million tons of crude oil (mainly of Arabian origin). In 1960, 19.1% of the input came from indigenous oil fields, 64.9% from the Middle East (mainly Saudi Arabia, Iran and Iraq), 8.5% from Venezuela, 3.7% from the Soviet Union, and the rest from other sources.

Although domestic crude production is steadily increasing, its percentage of the total refinery input will diminish in the future. Not unimportant future sources of crude oil may be Libya and Algeria.

The bulk of the 1960 capacity increase was due to two plants; Godorf of Deutsche Shell AG, and Dinslaken of BP Benzin und Petroleum AG, each with an annual throughput potential of around 4 million tons.

Shell at Godorf has a thermal distilling plant operating in conjunction with the gas separator and a hydrosulfurizer. Except for heavy residue, all fractions pass through the hydrosulfurizer, which operates on hydrogen from the 300,000 ton/yr UOP platformer. The output percentages of Shell Godorf were originally estimated as follows: fuel oil 55, gasoline and diesel fuel 13 each; jet fuel 2, gasoline and gases for the chemical industry 7, and LPG 3. This, however, is mainly on the basis of crude oils



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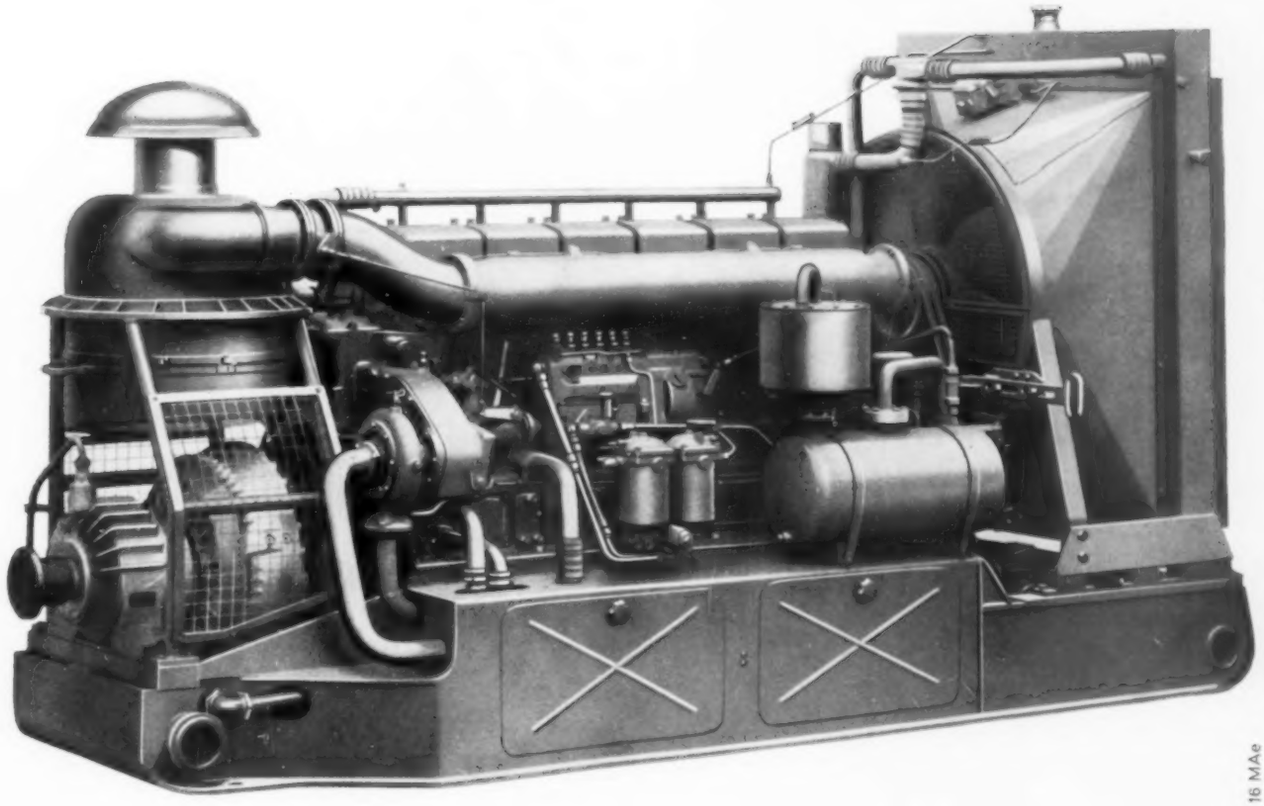

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TABLE 1—CRUDE CAPACITY OF WEST GERMAN REFINERIES

(Thousand metric tons per year)

Company and location	12/31/59	12/31/60
Badische Anilin- & Soda-Fabrik, Ludwigshaven*	48	—
BP Benzin und Petroleum AG, Hamburg-Finkenwerder	2,000	2,000
BP Benzin und Petroleum AG, Dinslaken	—	4,000
Deutsche Erdoel AG, Heide	1,500	1,500
Deutsche Erdoel AG, Wietze	40	40
Deutsche Shell AG, Hamburg-Harburg	2,800	2,800
Deutsche Shell AG, Monheim	280	280
Deutsche Shell AG, Godorf	—	4,000
Erdoelwerke Frisia AG, Emden	—	1,500
Esso AG, Hamburg-Harburg	2,540	2,700
Esso AG, Cologne	3,400	3,400
Gelsenberg Benzin AG, Gelsenkirchen	4,500	4,500
Gewerkschaft Deurag-Nerag, Hanover-Misburg	930	1,400
Gewerkschaft Erdoel-Raffinerie Emsland, Lingen-Holthausen	2,500	2,500
Kleinholz & Co., Essen	400	400
Mineraloel- und Asphaltwerke AG (Mawag), Ostermoor	250	250
Mineraloelwerke Peine (Schindler), Peine (Hanover)	18	18
Mineraloelwerke Albert Sengewald, Dedenhausen**	42	42
Mobil Oil AG in Deutschland, Bremen-Oslebshausen	1,500	1,500
Oelwerke Julius Schindler GmbH (BP), Hamburg-Neuhof	220	220
Purfina Mineraloelraffinerie AG, Duisburg	1,000	1,000
Ruhrbau Mineraloelraffinerie GmbH, Muelheim on Ruhr	300	300
Ruhrchemie AG, Oberhausen	450	470
Ruhroel, Chemiewerk der Steinkohlenwerke Mathias Stinnes AG, Bottrop**	120	120
Scholven-Chemie AG, Gelsenkirchen-Buer	2,000	2,300
Union Rheinische Braunkohlen Kraftsoff AG, Wesseling	3,000	3,000
Wintershall AG, Salzbergen in Emsland	115	215
Zeller & Gmelin, Eislingen in Wuerttemberg**	8	8
	29,961	40,463

*Abandoned. **Shut down.

TABLE 2—WESTERN GERMANY'S PRODUCT CONSUMPTION IN TONS

	1959	1960
LPGas	487,364	553,906
Carburetor fuel	4,640,900	5,450,900
Aviation gasoline	102,344	102,457
S.B.P. spirit	68,825	74,022
White spirit	117,285	124,486
Raw gasoline	214,121	439,630
Kerosine	55,066	57,259
Jet fuel	46,598	121,608
Diesel oil	4,302,400	4,666,000
Lubricating oil and grease	612,072	650,444
Fuel oil	10,058,700	13,880,400
Paraffin and slack wax (approx.)	50,000	58,000
Vaseline (approx.)	5,000	7,984
Bitumen	1,211,944	1,355,328
Petroleum coke	85,521	138,909
Refinery gas	176,167	235,441
Other products	60,797	84,415
Extracts and residues	11,023	11,273
Deliveries to domestic market	22,306,127	28,012,462
Oil industry's own consumption	1,451,322	1,787,373*
	23,757,449	29,799,835

*—including 987,896 tons of fuel oil, 179,231 tons of petroleum coke and 620,246 tons of refinery gas.

Bunker oil, all flags	1,846,546	2,347,346
Fuel oil from coal and oil shale		
Lignite tar and shale oil	197,106	199,042
Hard coal tar oil	273,357	232,419
Refineries' own consumption	21,721	19,524
	492,184	450,985

from the Middle East. As soon as more crudes from other areas (Sahara, South America, Far East) are handled, the output changes accordingly.

The refinery at Bucholtwelmen near Dinslaken built according to designs of the British Petroleum Co. for the marketing needs of BP Benzin und Petroleum AG is fed with crude oil through the pipeline from Wilhelmshaven. Two atmospheric stills have a potential throughput of 50,000 b/d each. There is a 450,000 ton/yr UOP Platformer, hydrogen from which is used to desulfurize the gas oil (capacity 480,000 ton/yr). Further units at the works are the Claus sulfur plant, the gasoline sweetening plant, and the LPG separator.

During 1961 a 500,000 ton/yr fluid catalytic cracking unit will be commissioned at Dinslaken. Furthermore, a bitumen plant with an annual output of 100,000 tons is to be erected.

Iranian crude with a low sulfur content from the Agha Jari field as well as crudes from Iraq and Venezuela will be treated at Dinslaken. The breakdown of the output, which varies according to the origin of crudes, is approximately as follows: 6% light gasoline for the petrochemical industry; 12 to 15% motor gasoline; 30% middle distillates, 38 to 44% heavy fuel oil, and 4 to 5% LPG and jet fuel.

The famous Swiss politician and economist Gottlieb Duttweiler and the American Independent Oil Co. together with others participate in the newly built refinery of Erdoelwerke Frisia AG at the North Sea port Emden, which started production in September 1960. The harbor of Emden on the Ems river does not allow the landing of big ships. However, super tankers which supply the refinery with crude from the Neutral Zone are unloaded in the open sea by the help of three smaller tankers.

The annual crude throughput capacity of the Frisia plant is 1.5 million tons or 30,000 b/d. There is a catalytic reformer on the Sinclair-Baker system with a capacity of 200,000 ton/yr and a desulfurizing plant for middle distillates with the same capacity. Besides crude from the Neutral Zone, considerable amounts of Russian crude are handled at Emden according to a refining contract with a French company. When the input is Arabian crude mainly, the yield is about as follows: 65% heavy fuel oil, 16% gasoline, 11% gas oil and 3% LPG.

To keep up with the rising production of the oil fields in the Emsland district (near the Dutch border) the Gewerkschaft Erdoel-Raffinerie Emsland, a joint interest of Wintershall AG and Gewerkschaft Elwerath, decided to erect a new combined distillation and coker plant on its refinery site at Lingen-Holthausen. This coker with a capacity of 500,000 tons of German crude per year will primarily serve for the production of petroleum coke, middle distillates and motor gasoline. After the commissioning of the new coker, expected in the autumn of 1962, the Lingen works will have a throughput capacity 3 million ton/yr.

At Heide in Schleswig-Holstein, where Deutsche Erdoel-AG operates the northernmost refinery in Germany, a further extension can be awaited up to mid-1962. The crude distillation potential of Heide, now 1.5 million ton/yr, will be stepped up to 2.6 million ton/yr. The Heide works, which have also specialized in ethylene and propylene, will feed two new petrochemical works to be erected at Brunsbuettelkoog on the Kiel-Canal, not far from Heide.

One of these, a joint interest at Deutsche Erdoel-AG and Reichhold Chemie AG, is the Oleonaphta Chemische Fabrik GmbH. Oleonaphta establishes, inter alia, a plant with an annual capacity of 10,000 tons of alkyl phenol at Brunsbuttelkoog.

A second project is a plant to produce 50,000 ton/yr synthetic alcohols at Brunsbuettelkoog. For this reason, Condea PetrochemieGmbH was founded, in which Continental Oil Co. and Deutsche Erdoel-AG each hold an interest of 50%. Ethylene from Heide will be used as raw material for the production of higher straight-chained alcohols (fatty alcohols) according to Professor Ziegler's patents. The alcohols are to be sold under the trade name of Alfol alcohols.

Esso AG is mainly engaged in the building of new refinery centers on the Upper Rhine and in Bavaria (Ingolstadt). At Karlsruhe (Upper Rhine) Esso has purchased a 500-acre plot, where a refinery with an annual throughput capacity of 3.6 million tons is to be erected. The plant will be supplied with crude through the big pipeline from Lavera near Marseilles to Karlsruhe which shall be completed end of 1962. The refinery is starting operation in the beginning of 1963. A group of engineering firms: namely Lurgi, Lummus and Uhde, were entrusted with the designing work.

A second refinery will be built near Karlsruhe by Oberrheinische Mineraloelwerke GmbH (a consortium in which Deutsche Erdoel-AG, Gelsenberg Benzin AG, Mobil Oil AG, Wintershall AG and Scholven Chemie AG participate). With the exception of Deutsche Erdoel-AG, all these companies are suppliers of the market organization of BV-Aral AG, which runs more than 5,300 filling stations in the Federal Republic. In the first building stage, to be completed early in 1963, the plant will reach an annual throughput capacity of 2 million tons. It can be foreseen that

A refinery is born

The first stirrings on the site of a refinery-to-be. The scene here is in Belfast, but it is typical of many other sites—in Europe, Africa (North, South, East and West) and the Middle East.

In sixteen widely separated places refineries are being planned or built or are undergoing major expansion by BP and its associates... tangible symbols of progress with British Petroleum.

BP

Aerial view of new Dinslaken refinery of BP Benzin und Petroleum AG

TABLE 5—WEST GERMAN CRACKING AND REFORMING

(Thousand metric ton/yr, as of 12/31/60)

Location	Catal.* cracking	Therm.** cracking	Catal. reforming	Thermal reforming	Hydrogen-ation
BP Hamburg	—	210	250	150	—
BP Dinslaken	—	—	450	—	—
DEA	530	—	160	—	—
Deurag-Nerag	—	970	300	—	—
Esso Harburg	542	—	305	—	—
Esso Cologne	—	—	345	—	—
Frisia	—	—	200	—	—
Gelsenberg	450	—	1,250	—	720
Lingen	860	—	310	—	—
Mobil Oil	350	—	200	—	—
Purfina	—	—	150	—	—
Ruhrchemie	230	—	150	—	60
Scholven	240	—	430	—	450
Shell Hamburg	550	—	350	—	—
Shell Godorf	—	—	300	—	—
Wesseling	—	750	265	300	450
	3,752	1,930	5,415	450	1,680

*Total feed. **Fresh feed only.

considerable amounts of crude from Libya will be treated here as well as in the neighboring plant of Esso.

It may be unique that the decision to erect a refinery originated from the need of a chemical works for raw material. This was the case when California Texas Oil Corp. decided to build a refinery on the southern bank of the Main river, west of Frankfort, in cooperation with Farbwerke Hoechst AG. Farbwerke Hoechst already receives about 260,000 tons crude annually from Caltex fields in Arabia and Sumatra, from which petrochemical raw materials are derived. When Hoechst, however, did not intend to enlarge its own crude oil treating facilities, the management of Hoechst contacted several oil companies to promote the erection of a nearby refinery from which larger amounts of olefins, light gasoline and synthesis gas could be obtained.

In March, 1961, an agreement was concluded between Caltex and Hoechst. Caltex is to build a plant with a crude capacity of 2 million ton/yr (40,000 b/d) to go on stream end of 1963. Apart from the distillation units, a hydrotreater as well as a cracker for the production of olefins is to be built. The crude may be supplied through an extension of the existing Rotterdam-Cologne-Wesseling pipeline, in which Caltex already participates, south to Frankfort, or eventually through a branch of the Marseilles pipeline leading from Karlsruhe to the north. Frankfort will be the first Caltext refinery in Germany, where the group developed a market organization in the post-war years.

In October, 1959, the Italian state concern Ente Nazionale Idrocarburi—sponsored by the Bavarian minister of economy—formed with Bavarian banks a group which announced plans to build one or two refineries in Southern Germany and to connect them with the Italian port of Genoa by a trans-Alpine pipeline, a branch of which shall also feed the projected refinery at Aigle near the Lake of Geneva (Switzerland).

An affiliate of ENI and Bavarian banks was constituted under the name of Suedpetrol AG fuer Erdoelwirtschaft, Munich. To build up a market outlet in Germany, which hitherto was lacking at all, AGIP, the sales organization of ENI, founded a branch in Munich, which in the meantime acquired a small number of filling stations in Bavaria. Suedpetrol AG chose a site south of Ingolstadt, where a refinery is to be erected with an initial annual throughput capacity of 2 million tons. The plant will be completed in 1963, together with the trans-Alpine pipeline.

Furthermore, Suedpetrol projects a second refinery in the Stuttgart area (Wuerttemberg). Up to now, however, the building of the pipeline to Ingolstadt as well as of the refinery itself has not yet been started. Suedpetrol's negotiations regarding the purchase of plots in the area of Stuttgart have also not yet come to a conclusion.

Early in 1960, the leading marketers in Western Germany also decided to erect refineries in Bavaria. Deutsche Shell AG selected Ingolstadt as location for its new plant and purchased a plot near Grossmehring, some miles east of Ingolstadt, north of the Danube. Shell has announced that the potential annual throughput of the Ingolstadt works should not be below 2 million tons of crude. This refinery, as well as some other plants, will be suppiled with crude through an extension of the Marseilles pipelines from Karlsruhe to Bavaria, in which all future Bavarian refineries (and their partners) except the group ENI-Suedpetrol will participate. It can be anticipated that this branch line, for which an operating company, the Rhein-Donau Oelleitung GmbH, is to be formed, will be completed in 1963, so that the Shell plant in Ingolstadt may start operations early in 1964.

Esso AG acquired a site for a new refinery northeast of Ingolstadt near the village of Desching, the capacity of which will also be 2 million ton/yr in the first stage.

A further plant with similar capacity will in all probability be built in the area between Ingolstadt and Regensburg under the operatorship of Gelsenberg Benzin AG for the same consortium which is building the refinery in Karlsruhe. Sooner or later, BP Benzin and Petroleum AG will erect a refinery in southern Germany, too. Standard Oil (Indiana), J. Paul Getty and others are also considering local refining facilities in southern Germany. But no definite decisions have been made yet.

With the completion of all these projects, the refinery capacity of the Federal Republic may increase to about 60 million ton/yr by 1965. The realization of the plans during the next years, however, depends on the continuous prosperity in the country, which is the presupposition of the forecasted rise of oil demand. END

TABLE 3—WEST GERMAN FINISHED PRODUCT OUTPUT IN TONS

Products	1959	1960
LPGas	603,946	770,150
Motor gasoline	4,473,927	5,383,087
SBP & White Spirit	171,191	191,113
Raw gasoline	162,334	252,141
Kerosine	46,021	51,932
Jet fuel	219,480	207,795
Diesel oil	4,430,477	4,841,575
Lubricating oil	428,669	480,851
Bitumen	1,077,798	1,160,384
Fuel oil	8,579,936	13,340,750
Petroleum coke	301,573	307,017
Fuel gas	646,237	856,844
Other products	146,932	177,822
	21,288,521	28,021,461

TABLE 4—WEST GERMANY'S PROJECTED REFINERIES

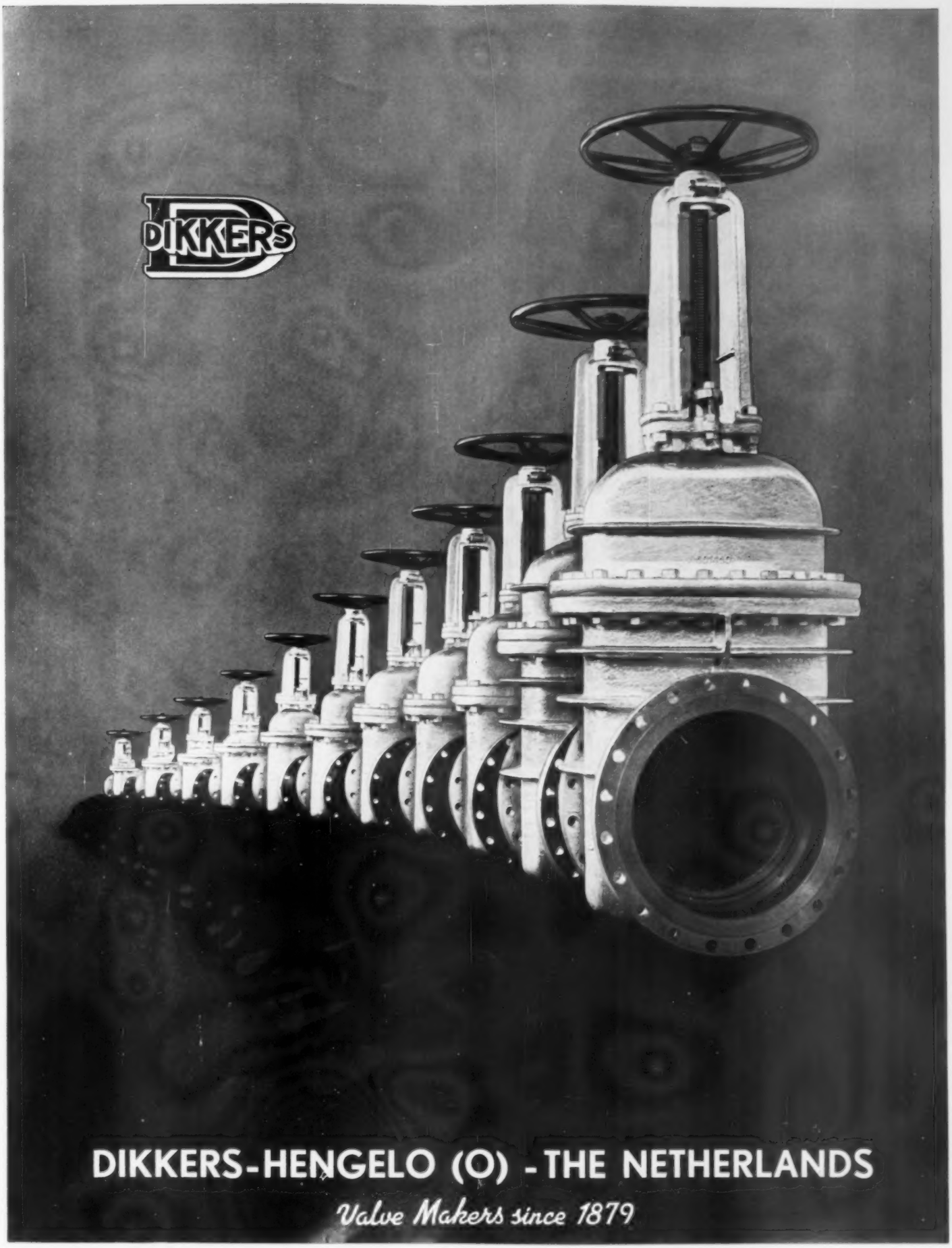
(Thousand metric ton/yr)

Company and location	Crude capacity
California Texas Oil, Frankfort	2,000
Deutsche Shell AG, Ingolstadt	2,000
Esso AG, Karlsruhe	3,600
Esso AG, Ingolstadt	2,000
Gelsenberg Benzin/Mobil Oil, East Bavaria	2,000
Oberrheinische Mineraloelwerke, Karlsruhe	2,000
Suedpetrol AG (74% ENI), Ingolstadt	2,000

TABLE 6—WESTERN GERMANY'S LUBE OIL CAPACITY

(Thousand metric ton/yr, as of 12/31/60)

DEA, Hamburg-Grasbrook	150
Deurag-Nerag, Misburg	85
Esso, Hamburg-Harburg	82
Mobil, Bremen-Oslebshausen	50
Shell, Harburg-Grasbrook	180
Shell, Monheim	60
Schindler, Hamburg-Neuhof	80
Wintershall, Salzbergen	50
	737



IN CANADA: G. DIKKERS OF CANADA LIMITED, SCARBOROUGH, ONTARIO

One of the most prolific fields off the Louisiana coast is Bay Marchand. In the foreground is the mobile unit Penrod 51. In the background at right is one of California Company's 24-well platforms

Offshore technique improving

by James W. Calvert

Mobil rigs have proved to be most suited to development of proved offshore fields. Improvement in design has reduced costs, but offshore production is still a long way from payout

ABOUT THE WORST THING that can happen to an offshore oil operator is to discover a small field.

One company executive compared this experience with drawing the second best hand in a poker game: after paying the fantastic costs for offshore exploration—leases, construction, transportation—you can't afford to quit and there's always the chance that the next well will make a winner.

Fortunately, there are not many "small" fields in the offshore areas of the Gulf of Mexico off the Louisiana coast. Although far from a pay-out (the oldest and most prolific field is still $40 million in the red) most oil men view the Gulf as being the greatest potential for oil and gas reserves in the continental United States and they are optimistically seeking new methods and building new tools that will enable them to drill in deeper water farther and farther from shore.

After the slump which followed the offshore "boom" of 1955-57 there appears to be a gradual resurgence of drilling in the Gulf. One explanation is that some of the offshore fields have reached the development stage and are producing as much oil as the state's allowable will permit.

For example, Shell Oil Co. is now producing 50,000 b/d from its Block 27, East Bay, field between the two navigable passes of the Mississippi River. There are now approximately 275 producing wells in this field and Shell has three mobile rigs working, each completing a well every 10 days.

At one time, during the peak of the offshore "boom," there were 85 rotary rigs working in the Gulf of Mexico, today there are about 60 rigs offshore with from two to six idle at one time. This figure does not accurately tell the story, however. Of the 85 rigs counted at the so-called peak of offshore drilling, more than 50% were land rigs mounted on single-well platforms and served by floating tenders which provided storage for drilling supplies and housing for the drilling crews. Other land rigs were mounted on the huge multiple-well self-contained platforms, giant islands of steel erected in the ocean at enormous costs but which provided all servicing facilities without the use of floating equipment except for transportation. The balance of the rigs were in the mobile units and the submersible structures which could be moved from one location to another.

Through costly experience the industry has found that the mobile unit is the most economical method of drilling for gas and oil at sea in relatively unproven area. The single-well structure has practically gone out of existence and most of the elaborately outfitted floating tenders are tied up. To some extent the same may be said of the self-contained platforms. Construction of these units has been reduced to a minimum, mostly those serving proven fields where 24 or more wells can be drilled from a single platform.

The bulk of the offshore drilling is now being carried on by the mobile units, usually drilling four-well clusters before being moved to new locations. That is one of several methods the industry has found to reduce offshore drilling costs. Another has been the adoption of the time-study techniques, long a common practice of the manufacturing industries. By tightening up on operation efficiency and generally speeding drilling, Gulf Oil Corp. has cut the time for drilling a 10,000 foot well from 10 days to little more than two days. Recently a

California Company was the first to develop an underwater storage unit in the Gulf offshore fields. This shows the 20,000 barrel S-93 being towed to its first location from the shipyard of Bethlehem Steel Company in Beaumont, Texas

One of the newest offshore drilling giants is S-66, shown here on a drilling location in the Gulf of Mexico. Owned by Barge Facilities, Inc. of San Francisco, it is under lease to the California Company

drilling crew on a Gulf well in Timbalier Bay, three miles off shore, made a mile and a half in one day.

Still another manner in which the industry has found a way to save money is in the method of platform construction at sea. Through exhaustive studies of wave and wind force action the engineers have determined that permanent offshore structures do not require such sturdy foundation that once went into the building of drilling and production platforms. At one time they felt that a minimum of 10 concrete pilings was needed to support an offshore platform; now they use four.

The CATC group (Continental Oil Co., Atlantic Refining Co., Tidewater Oil Co. and Cities Service Production Co.) recently completed construction of a four-pile drilling platform at the farthest offshore site in the Gulf and in 180 ft of water. This is in Eugene Island Block 269, 70 miles offshore, where CATC has a block of 37,800 acres. The first of five wells has been spudded and will be drilled to 14,000 ft.

The platform has two relatively small decks. These are a production cellar deck, 30 by 40 ft, and a drill deck 54 by 60 ft about 30 ft above the cellar deck. Wells will be drilled on the larger deck which then will be removed, leaving a cluster of five completed wells on the production deck. The drilling deck and its equipment will then be transported to another location for further offshore drilling.

The California Co., in its Bay Marchand field, developed the use of completion rigs to reduce the pre-well cost. Deep drilling rigs of 2,000 hp work simultaneously on the same platform with smaller completion rigs having skid-mounted draw works and powered with 300 hp engine drive. When the drilling rig finishes its assigned task and sets producing casing it is moved to another location on the same platform and the completion rig is moved on to bring in the well. Meanwhile the drilling rig is at work on the second well and this cycle continues until all wells on the 24-well platform have been completed. California Co. officials estimate that in one year this method alone has enabled the multiple completed wells to produce an additional 250,000 barrels of oil.

These producing offshore fields are, naturally, those nearest to the shore. Meanwhile the industry is looking to the thousands of square miles of the Miocene sands which they feel sure extend to the rim of the continental shelf far out to sea and to some 600 ft of water depths. Much engineering study has gone into the development of such techniques as drilling from a floating, rather than a fixed platform, and underwater completions. These studies are still in their experimental stages and the major companies who are spending great sums of money in the development are highly secretive about their progress.

California Co. drilled two wells off the Florida Keys from a floating platform, a converted LSM fitted with equipment for drilling over the side. One of these wells was a success from an operational standpoint although it proved to be a dry hole. The second was unsuccessful.

The same company recently made an underwater completion of a wildcat well in Marsh Island block 135, but the method used is a tightly guarded company secret and any questions about the techniques employed are answered with sly grins. However, many feel that the successful development of underwater completions will be the answer to deep water drilling and are going forward with the experimentation.

The matter of underwater completion, of course, precludes the successful use of a floating platform for drilling. Offshore operators have watched with great interest the practice runs of the Mohole project off the coast of California and Mexico.

The Mohole project was designed as a scientific study of the Mohorovicic Discontinuity by drilling through the earth's crust to the underlying rock. To accomplish this the scientists intend to drill from a ship that is held in place by a series of outboard motors, fore and aft on each side of the vessel. In experimental tests it has been determined that the vessel can be held at all times within 50 feet of the hole location.

Practical offshore operators feel that the Mohole Project undoubtedly will contribute much to their knowledge of underwater drilling, but question whether the outboard motors can hold a floating platform close enough to location to permit successful reentry of the hole with drill pipe.

Two answers to the problem of floating platform drilling may be forthcoming in the fairly near future; at least there are plans on the drawing board for two types of floating rigs which may prove practical, although in both cases the designers say that "ground contact" will be necessary in the form of a guide for the drill stem.

Ocean Drilling & Exploration Co. of New Orleans is asking for price estimates for the construction of an "L" shaped floating island that is the design of its president,

Shell Oil Company's Block 27 field, South Pass now has 275 wells producing approximately 50,000 barrels per day. In the foreground are Shells central facilities on Southwest Pass of the Mississippi river

Alden J. Laborde, and its chief engineer, Tom S. Graham. The vessel would consist of a series of tubular members built in the form of an "L," each leg being 350 feet long, with the derrick and drilling structure inside the angle of the "L" which is the center of flotation. The hull would have a series of 24 cylindrical casings mounted between the tubular members and the top of the hull. These are buoyancy chambers to maintain the unit's load carrying capacity.

The platform would be held in place by anchors but the lattice work of the structure would permit seas to roll through it, rather than against it, thus eliminating or materially reducing the sea motion which has been the greatest drawback to drilling from a floating platform.

In its drilling position the platform would be partially submerged and drilling would be accomplished through a jacket extending from the platform to the ocean floor and held in place by stabilizing status extending outward from the jacket. The inventors believe this structure will operate successfully in water up to 300 feet deep, and conceivably can be adjusted, by extending the drilling jacket and anchorage system, to drill to the 600-foot maximum generally understood to be the rim of the continental shelf.

The hull of the structure, from the lower tubular members to the deck, will have a vertical clearance of 100 feet which will permit the unit to be used as a conventional submersible platform with a working water depth of 60 feet. This would be accomplished by completely ballasting the lower hull until the structure rested on the ocean floor rather than being partly submerged.

Company officials have placed a cost ceiling of $5,000,000 on the platform.

"There is a limit on what we or any other contractor should spend on equipment of this type," explained Laborde. "After all there must be a limit on what oil operators are willing to pay us to drill for $3 oil under present allowables. That, of course, governs the economics of such a project."

Accordingly, the company has asked several shipyards for cost estimates and if these are within the arbitrary ceiling a contract probably will be awarded within the next few months. The designers estimate it will require a year to build.

Still another type of floating unit is now on the drawing board of Friede & Goldman, New Orleans marine architects who have specialized in offshore oil drilling vessels. This would consist of a circular, dough-nut shaped hull with the superstructure resting on eight caissons. The structure would be anchored to the bottom in such a manner that it would constantly stay within 10 feet of the hole location even in winds up to hurricane intensity. In its drilling position the unit would be submerged by ballasting to about 40 feet so that it would float with wave clearance. In this manner, its designers believe the unit will be able to drill in water from 300 to 600 foot depth, but would require some form of underwater completion. The designers estimate that the unit would cost considerably less than the typical deep-water mobile unit although it will still require an expenditure of considerable money, possibly as much as $1,000,000, for engineering and experimentation before it can be perfected.

Meanwhile, offshore oil well drillers are still building the more conventional type of mobile unit, except now they are bigger than ever. The latest to go into operation is the gargantuan S-66, owned by Barge Facilities, Inc. of San Francisco and leased to California Co. The structure, built at Avondale Shipyards, Inc., is now operating in Bay Marchand.

There have been two schools of thought in the designing and construction of offshore mobile units. One held to the pattern of the original "submersible," a drilling platform supported by fixed uprights on a barge hull which could be submerged or raised by ballasting sea water. The other held to the theory of a single barge hull with legs, or spuds, which would be dropped to the ocean floor and the barge elevated hydraulically or mechanically to become a drilling platform. The S-66 encompasses both principles.

The lower pontoon is a barge shaped hull 184 feet long, 117 feet wide and eight feet deep. It is honeycombed with bulkheads to form pump rooms and ballast tanks. The main hull, which in towing position rests on top of the pontoon, has an overall length of 217 ft. 6 inches, a beam of 117 feet and depth of 14 feet. This hull also is honeycombed to provide additional stability in the event of a rupture in the pontoon. On the corners of the pontoon are steel cylinders, 12 feet in diameter and 180 feet in length which comprise the four main columns of the rig. On the perimeter of each column are lugs placed every 90 degrees on 14-foot centers. There are 44 lugs on each column and these carry the weight of the barge and the drilling load.

On location 16 hydraulic jacks first lower

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This is a typical offshore well jacket supporting two well heads. The two wells are drilled to different sands to comply with the 40-acre spacing pattern. In the background is ODECO's submersible drilling barge MARGARET

Not all the offshore troubles are confined to United States development. This offshore rig belongs to Japanese interests drilling off the Neutral Zone in the Middle East. The fire has been burning for months, and little can be done about it. A deviated hole may be drilled to kill the fire eventually, but the rig is a total loss

the pontoon to the bottom of the sea where it acts as a fixed foundation. This enables the S-66 to operate on soft bottoms. Finally the barge is jacked up to drilling height. Four wells can be drilled from this platform at a single location.

Now under construction, also at Avondale, is the Kermac 54 recently ordered by Kerr-McGee Oil Industries, Inc. and estimated to cost between $6.5 and $7 million. It is expected to be in operation by April of 1962. This structure will be in the form of an equilateral triangle, 330 feet long, with a compartmented tank at the bottom of each corner. These footings, and the working level of the platform, will be linked by three 200-foot conical shaped columns. In operation, the platform will be submerged by flooding the tank footings.

Two other types of units have been proposed for operations in even greater water depths. One would be a six-leg caisson supporting a barge 240 by 200 by 14 with capacity for operating in 200 feet of water; the other would be a four-leg jacking unit, supporting a 240 by 160 foot hull and capable of operating in water 225 feet deep.

The development of offshore producing fields has, of course, gone hand in hand with the problem of gathering oil and sending it to market. Two-fields—Shell's East Bay Block 27 and Calco's Bay Marchand field—have pipelines leading ashore so that barging is no longer necessary.

A gathering system of feeder pipelines from individual wells to production platforms provides the focal point for collection of crude. In East Bay, for example, each production platform serves as many as 40 wells. These production platforms are named alphabetically and already they have gone through the alphabet, from A to Z, and have started a second numbering system.

For the most part, however, companies must rely on barges to bring their product to market. Through more effective operation the average cost of barging crude from production platform to pipeline terminal has been reduced from 50 cents to 30 cents per barrel.

For several years oil company engineers have been working on the development of underwater storage. Production and drilling platforms built on piling can hold only limited above water storage. This sometimes creates a serious production problem, for if weather or sea conditions prevent barges from coming alongside for a lengthy period of time wells must be shut in until the oil can be removed.

Engineers for CALCO and ODECO came up with separate solutions of the problem. California Co. built an underwater storage unit utilizing the principle of hydrostatic pressure. It consists of a compartmented mat, 112 by 92 feet by 10 feet deep, supporting four 18 foot diameter steel columns that taper to five foot diameter at the water line. Each of these columns supports a platform 30 feet square which contain a helicopter landing and all the facilities necessary to produce the field.

The barge operates on the principle of oil/water displacement. The tanks are first filled with water to sink them. As oil is produced into the tank battery the water is displaced and flows into the ocean. Similarly, when a transport barge picks up a load of oil, sea water is pumped into the water receiver and flows by gravity to the bottom of the barge, displacing the oil from the top of the columns into the loading bins.

The storage battery has a capacity of 20,000 barrels.

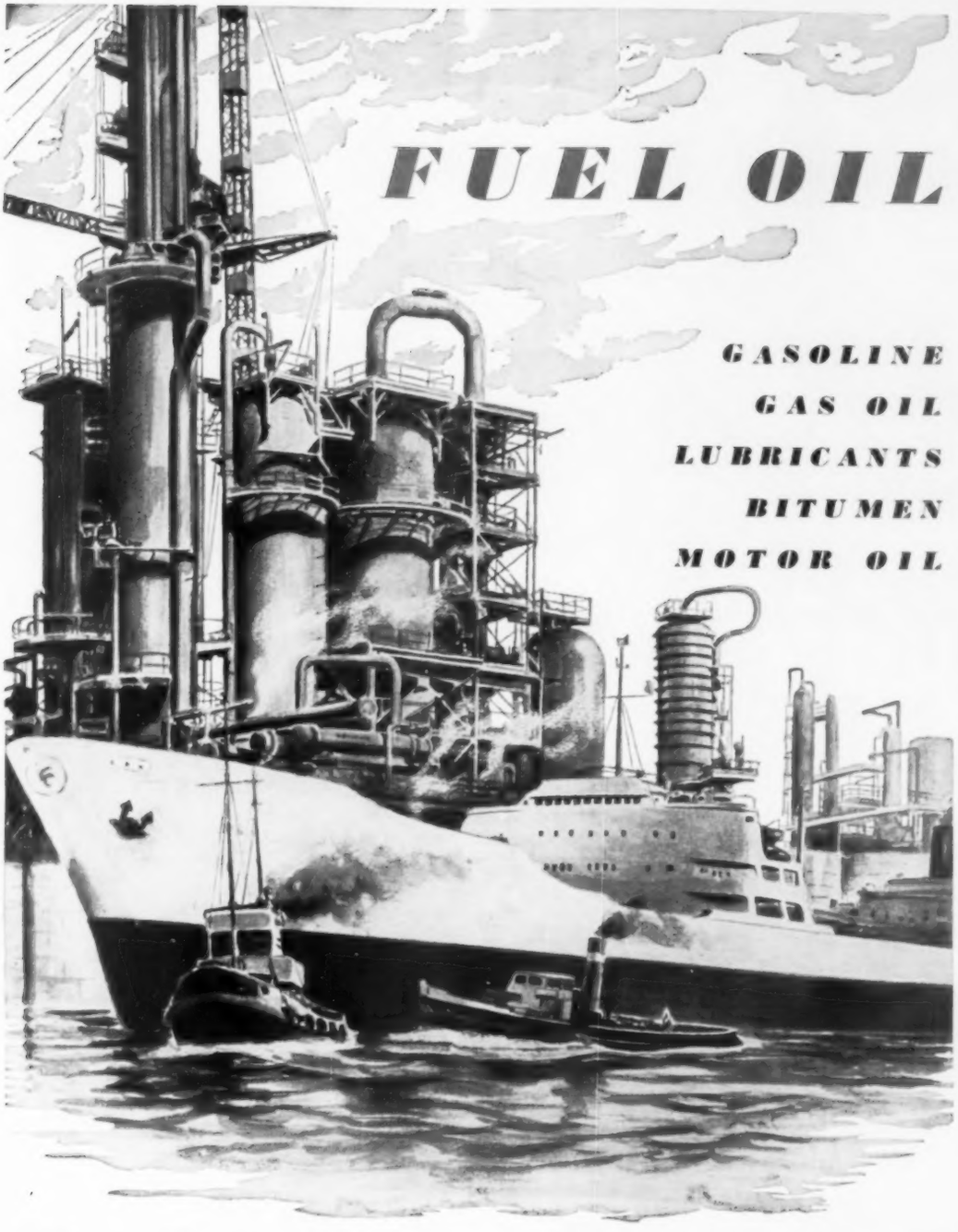
The platforms topping the four columns contain living quarters to accommodate eight men, a helicopter deck, generators to supply power for the unit, production equipment for the field such as low pressure separators, emulsion treaters, and meters.

The first unit was named S-93 and was sent to Eugene Island Block 110 field and submerged in 25 feet of water. CALCO has thought so highly of the unit that it has built a second, the S-94, and now both are in CALCO's Ship Shoal block 107 field.

ODECO's underwater storage facility, also of 20,000 barrel capacity, consists of a network of 16-foot diameter tubes which form the storage tanks. These tubes form a rectangle, the ends of which are water ballast tanks. Covering this rectangle are a series of pans for holding fixed ballast and rising from the tanks on steel supports are three platforms to provide service facilities for the unit.

The unit was towed to Eugene Island block 90 field where the ballast pans were filled with rocks and the water ballast tanks filled to submerge the unit. With this principle of operation salt water does not come in contact with crude oil. To remove the barge it is only necessary to blow out the water ballast tanks. When the unit slowly rises to the surface the rock ballast is discharged and the unit ready for towing.

A second unit of this type is now being constructed by Ocean Drilling and Exploration Co. END



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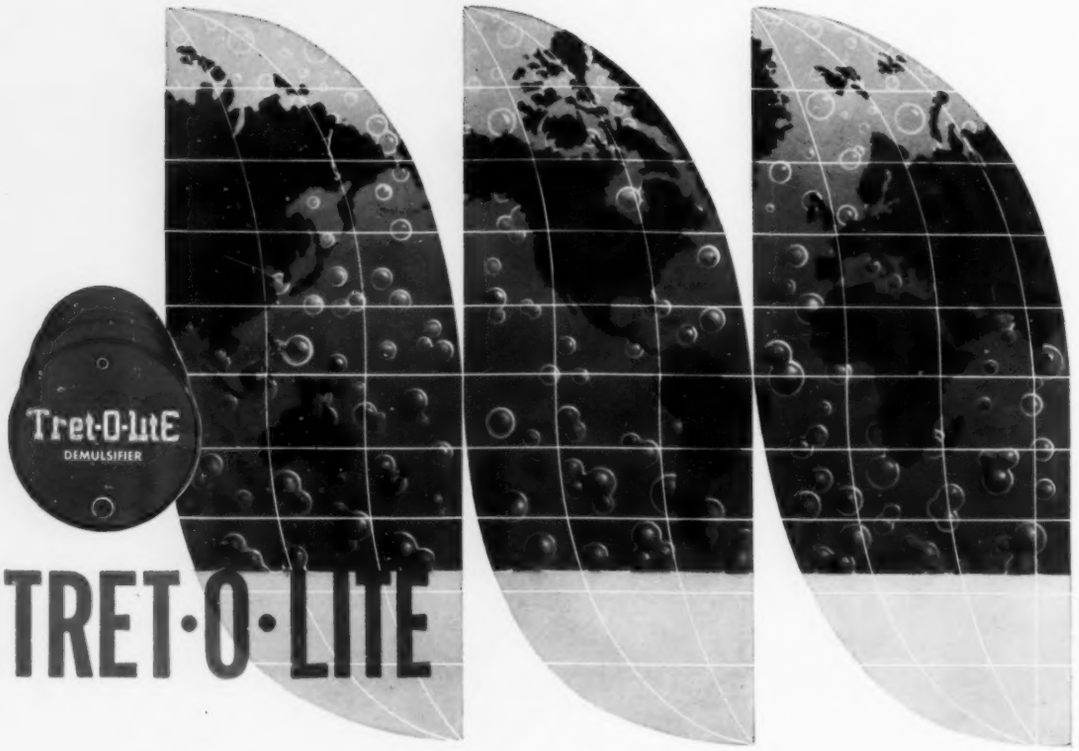

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Wherever petroleum is produced or refined, TRET-O-LITE* Demulsifiers are available to correct emulsion problems efficiently and economically.

Water is a detriment to operations and to equipment in the field and in the refinery. It lowers gravity, thereby reducing the selling price of the crude. Mineral salts in oil-field waters corrode production equipment, pipelines and storage tanks. In the refinery, water makes distillation difficult and hazardous. It increases maintenance costs by carrying salts and solids which are deposited in operating equipment. Demulsification is of prime importance.

Because of the many variations in the emulsions that may be formed, Petrolite offers a wide variety of TRET-O-LITE demulsifying chemicals. Treatment consists of adding a small quantity of TRET-O-LITE Demulsifier to the emulsion, dispersing the TRET-O-LITE in the emulsion by agitation (normal flow through the lead line and separator usually being sufficient) and providing a vessel in which the water can separate by gravity. Heating the emulsion-chemical mixture sometimes is needed to attain treatment.

Even when certain crude oils have been demulsified to exacting pipeline specifications, they still may contain residual moisture, salts and other impurities which can impair refining efficiency. When such salts are present, they can be removed efficiently and economically by either of two Petrolite desalting methods, TRET-O-LITE Chemical Desalting or PETRECO* Electric Desalting.

Whatever *your* emulsion problem, Petrolite's international engineering staff, research facilities, and half-century of experience are at your disposal. For petroleum processing equipment, chemicals or services, write or call one of the offices or representatives listed below.

Petrolite also offers FLUDEX* Water Flood Additives, KONTOL* Corrosion Inhibitors, KUPLEX* Metal Deactivator, SOLVO* Paraffin Removers, S.P.* Scale Preventives, TOLAD* Fuel Additives, BENDER Catalytic Sweetening, ELECTROFINING* Precipitators, PETRECO* Electric Dehydrators and PETRECO* Electric Desalters.

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PC-60-1F

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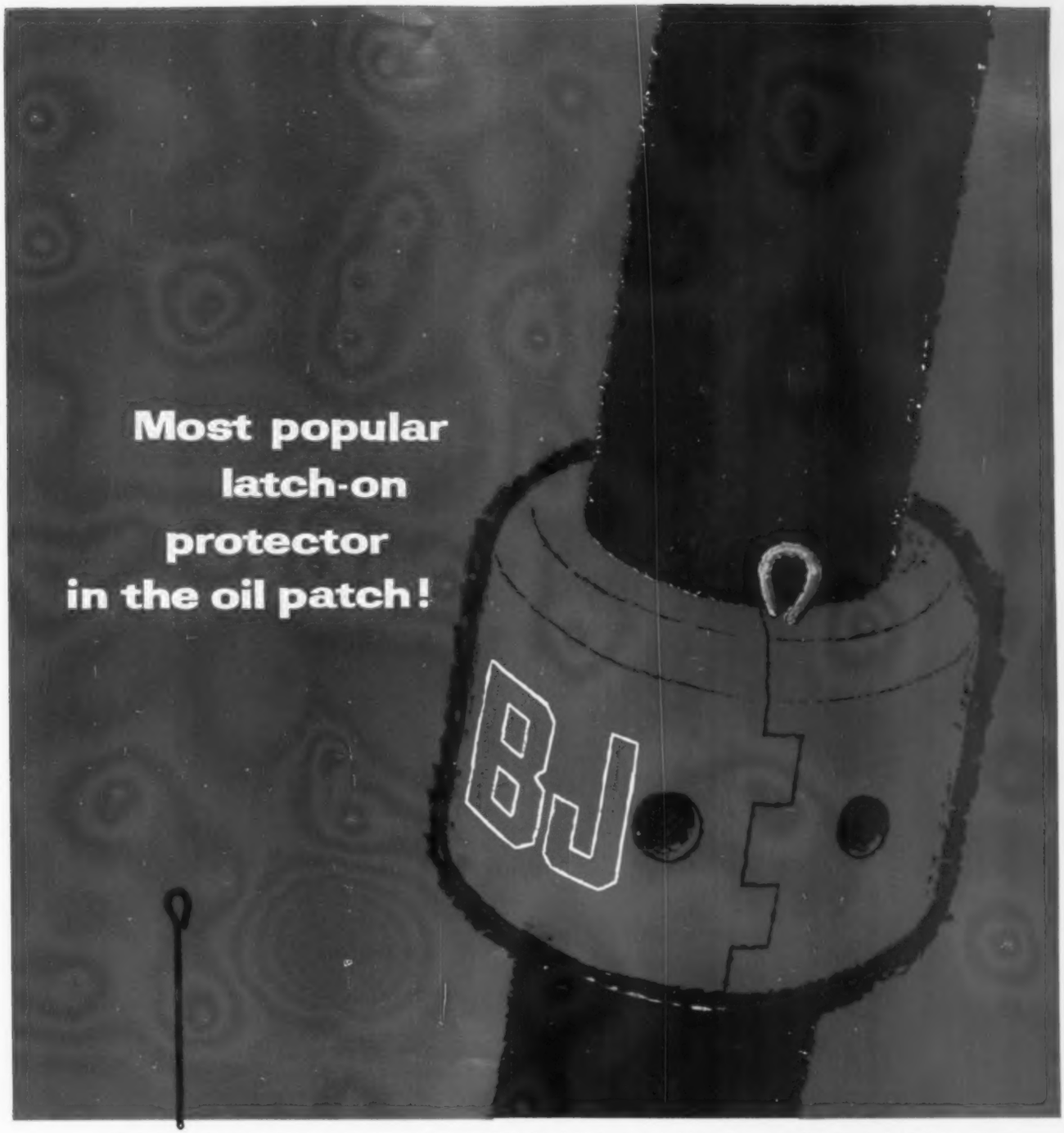

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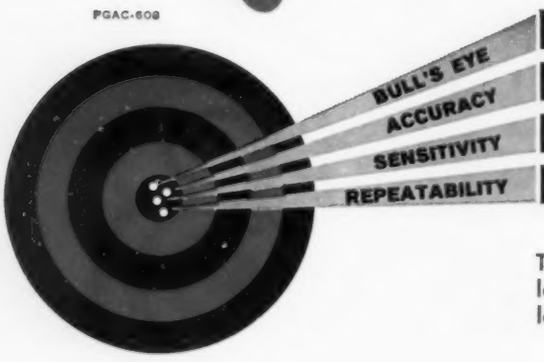

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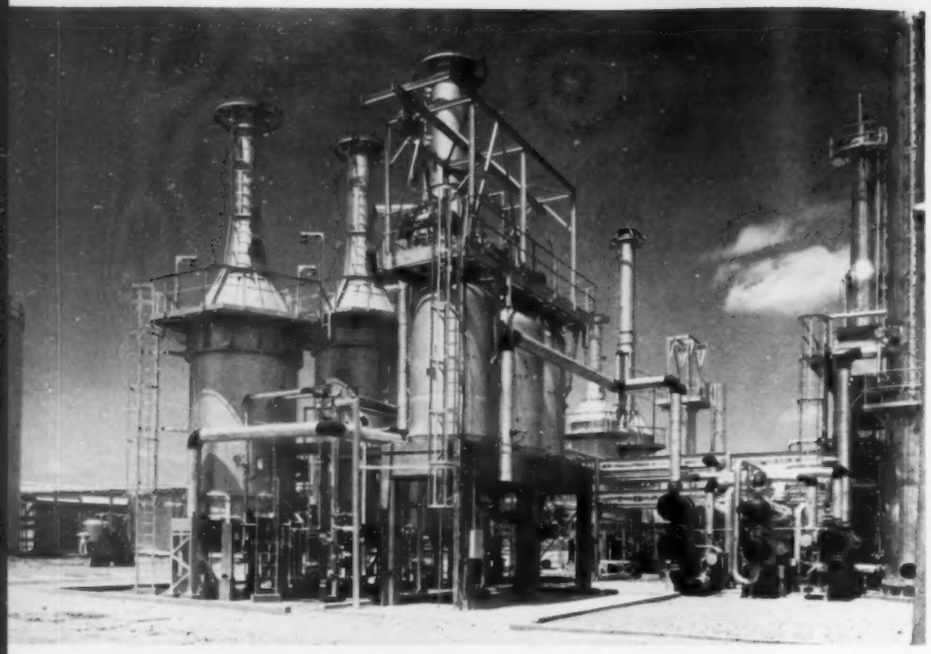
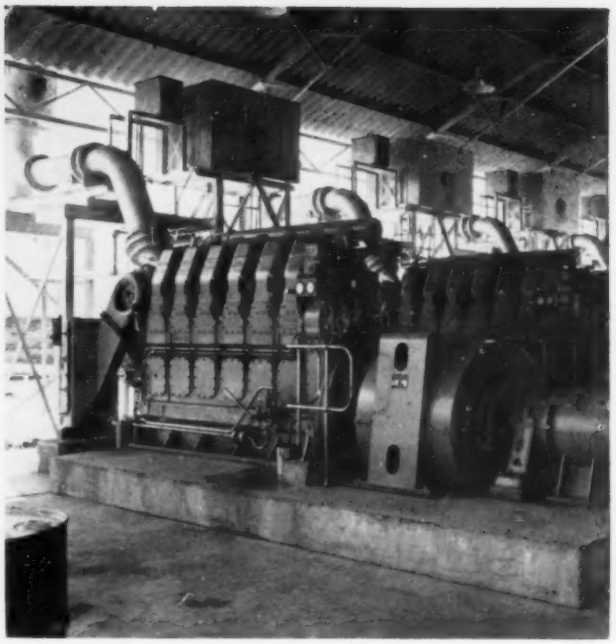




New Mozambique refinery serves southeastern Africa

Air-cooled heat exchanger units mounted overhead at the Platformer unit area

TYPICAL of the new generation of refineries designed to meet major product requirements of a contiguous area is the recently activated SONAREP plant near Lourenco Marques, Mozambique. Owner of the installation is Sociedade Nacional de Refinacao de Petroleos, subsidiary of the Portugese marketing company, Sociedade Nacional de Petroleos (SONAP).

The refinery is the first to be built in the Portugese East African area, and serves important consuming areas in Rhodesia and South Africa, which are conveniently supplied by railroad and truck transport. Lourenco Marques, near which the plant was built, is the most important seaport in Mozambique, and is a port of call for bunkers by a substantial number of ocean-going vessels. Large volumes of oil are required for refueling ships bound for Portugal, the United Kingdom, and the USA. Previously, all these requirements had been met by imports from Aden, Iran, and Saudi Arabia.

Mozambique's role as a major refuelling station and re-exporter of heavy oil is reflected in the design of the refinery. This traditional demand plus a more recently growing domestic demand makes it economically feasible for a local refinery to be built. Domestic product demand is about 3,000 barrels daily. Consumption ratios are about 30% gasoline, 56% gas oil and diesel, and 14% kerosine, lube oil and miscellaneous products.

The process design of all units, including crude distillation, Platforming, Unifining, and Merox, was done by Universal Oil Products Co., and engineered by Procon Inc., and Procon (Great Britain). Also engineered and built by Procon (Great Britain) were all the auxiliaries of a modern refinery—roads, lighting systems, the tank farm, TEL blending facilities, process and domestic water treatment and piping systems, the administration and laboratory buildings, process steam and power plants, and crude and product transmission lines from the refinery to the port of Lourenco Marques.

Major units of the refinery include a 12,000 b/sd crude unit, a 2,500 b/sd Platformer, a 2,500 b/sd diesel fuel Unifiner, and a 1,500 b/sd Merox gasoline treating unit.

Cooling facilities constituted possibly the most difficult problem for Procon engineers in designing and building the plant.

Seawater was considered for cooling but abandoned after careful study. Samples of available well water were submitted to a number of firms specializing in the treatment of difficult water. Two of these reported that the water was untreatable. Analysis showed that it contained 1,435 mg per liter of total solids, including 680.9 of chlorides, 62.0 of silica, 76.1 of sulfates, 236.7 of magnesium, 120.0 of calcium, and large amounts of carbonates and bicarbonates.

To limit water requirements to the steam plant and trim cooling, the builders in-

Far left: The 2,500 b/sd Platforming unit at SONAREP refinery in Mozambique

Left: Four diesel driven 500 kw generators provide electric power

Right: The 1,600-gpm cooling and treating plant for boiler feed and trim cooling water

stalled Hudson "Combinaire" coolers to handle the bulk of the load. These combination air and water cooling units are designed for 95 F dry bulb conditions and are capable of cooling product streams to 110 F. From this level, the trim coolers take over.

In the elaborate treating system, the well water has carbonate hardness removed by treating with lime in a precipitator. Alum is added as an aid in obtaining a flocculent blanket of precipitate in the lower portion of the precipitator.

From the precipitator, the effluent stream is split up between boiler feed and cooling water make-up.

Cooling water is reduced in pH by acid injection to prevent corrosion of aluminum-brass alloys.

Boiler feed water is filtered through a pressure sand filter to remove precipitate particles which would reduce efficiency of the base-exchange softener. In the case of cooling water, the particles settle out in the cooling basin and are removed by intermittent blow-down. After filtering, the boiler feed water has non-carbonate hardness removed in a base exchange softener. The boilers also have a scale inhibitor dosing pump for addition of a phosphate, and a deaerator for removal of oxygen and carbon dioxide. It is not necessary to add caustic soda to increase alkalinity to normal levels.

After base exchange, the total hardness is reduced from 180 to 10; calcium from 12 to 4; magnesium from 36 to 0; sodium from 405 to 0; and bicarbonates from 15 to 0. The pH value is 10.5.

The circulating water system has a normal capacity of 1,600 gpm. Temperature at the top of the tower is 105 F, and at the bottom it is 83 F.

The boiler plant is designed to produce an average of 15,000 lb/hr, and a maximum of 30,000 lb/hr.

Electrical energy for the plant is produced by four diesel-engine driven English Electric 500 kw units. Other offsite facilities include loading racks for both rail tank cars and tank trucks.

Purchasing, expediting, and shipping operations were directed by the London headquarters of Procon (Great Britain). Complexity of the purchasing operation is illustrated by the origins of construction materials, which came from Italy, Germany, France, Great Britain, the USA, and other countries.

Procon's superintendent arrived on the site October 25, 1959, and construction started the next month. The target completion date was March, 1961, and Procon completed the job some four months ahead of schedule.

Contributing to the remarkable speed were the following factors: excellent cooperation by SONAREP management, Mozambique officials, and local citizens. Customs officials, for example, consistently speeded clearance and delivery of equipment to the site.

Dock and port facilities were excellent. Weather, while hot, was dry, which presented no problem of moving heavy equipment through mud.

An intensive training program by Procon produced the large numbers of semi-skilled workers needed for the project. At the same time, this program created a labor pool for further development of the country.

Key men on the job—headed by Superintendent Walter M. Sweitzer—were from the USA and Great Britain. In all, five nationalities and 21 dialects were represented on the project. Skilled craftsmen were recruited from many parts of the African continent, with the rest of the labor force obtained locally.

One of Mr. Sweitzer's first tasks was to organize a welding and pipe-fitting training program. Its success was demonstrated when testing of the pipeline and storage tanks disclosed only one leak—which was quickly remedied. Of the personnel who are now operating the refinery, 95% had had no previous refinery experience until they started training under UOP's service department.

Commenting on the training program, Mr. Sweitzer said, "Welding is the key skill in refinery fabrication and construction, so we started classes in the first few weeks of the job. Welders were trained and progressively assigned work requiring higher skills until they qualified for work on high pressure and alloy lines. The same applied to all trades. We found there—as in most places in the world—that people want to learn, and are willing to make the effort needed to learn."

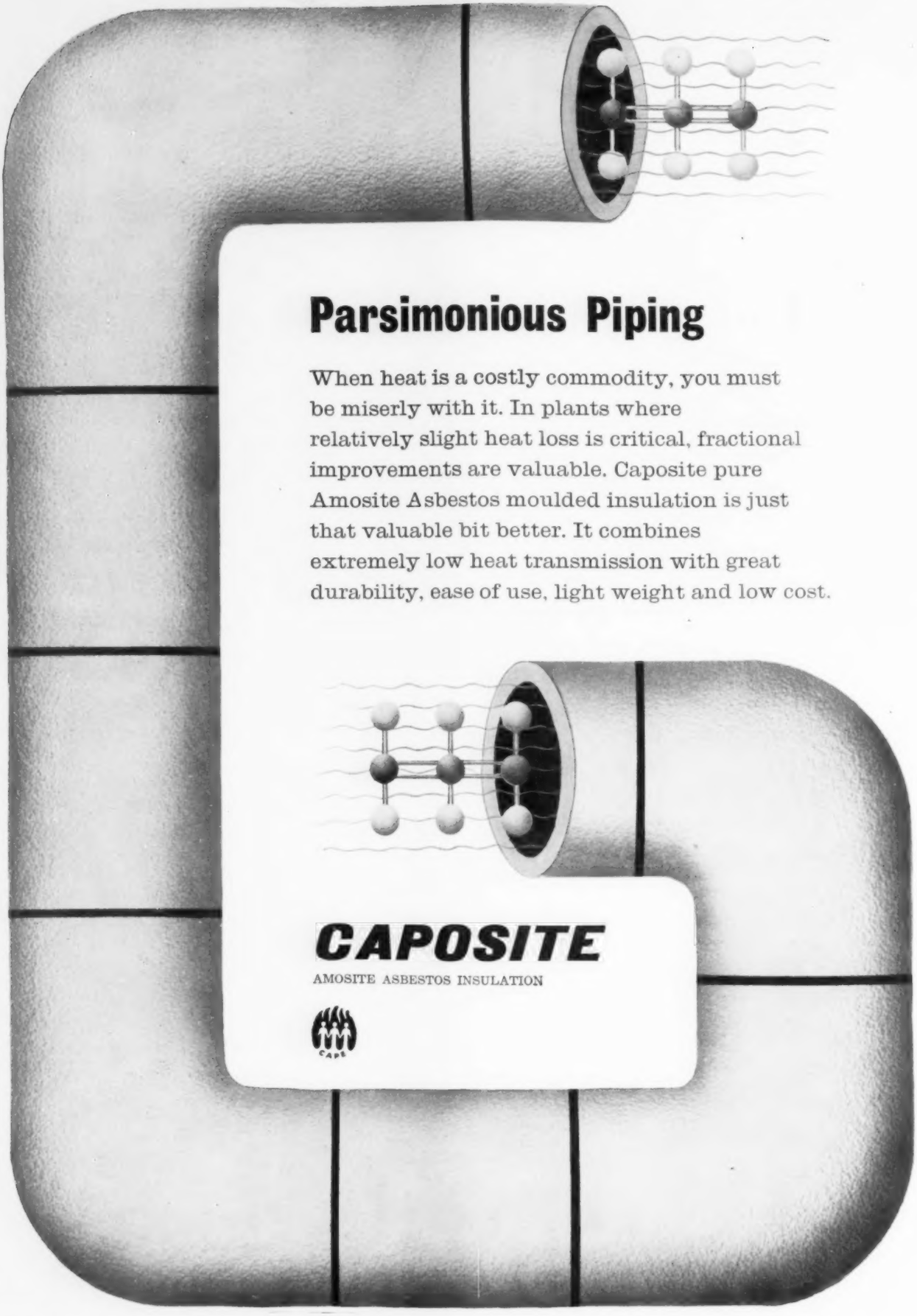
Procon's safety record also was remarkable, primarily because of Mr. Sweitzer's insistence on a weekly safety session. This weekly meeting also provided an opportunity for problems to be aired. There were no fatalities, not one serious injury, not a single accident that went beyond the scratch-and-bruise level.

Productivity remained high, despite temperatures reaching 117 F. Part of this is attributable to setting up a canteen to serve free lunches to a work force that numbered up to 600 men.

Port and dock facilities at Lourenco Marques are excellent since most of the imports and exports of Rhodesia and Johannesburg, as well as southern Mozambique, pass through the port. Heavy equipment, however, does not make up a great part of the port's tonnage so it was necessary for Procon engineers to improvise from time to time.

Fortunately, it was not necessary to build special docks for handling incoming and outgoing tankers. Loading and unloading lines were installed on existing piers where berths were available for tankers of adequate size.

END



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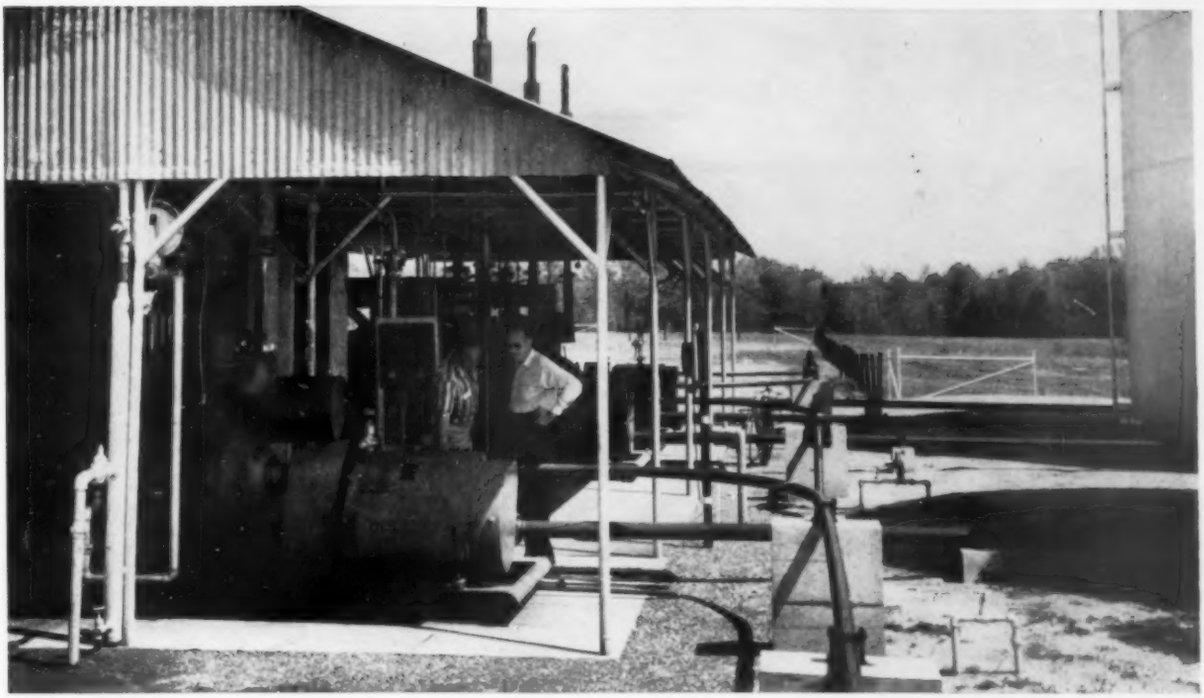

Why "Oilwell" waterflood pumps take it lying down

The pumps in the picture are operating in the New Odom field, and one of them has been pumping 24 hours a day for *eight months* without stopping. Naturally, it's an "Oilwell" pump and its design has a lot to do with its performance.

Every "Oilwell" plunger pump is designed horizontally for eight good reasons: *Low suction* . . . lowness of suction and discharge lines means maximum utilization of suction head and simplifies piping layout. *Less deadweight on crankshaft* . . . eases bearing loads, minimizes vibrational stress in frame and piping. *Simpler thrust transmission* . . . eliminates overhead yoke and pull-rod assemblies. *Cleaner installations* . . . any leakage is confined to frame cradle by gravity. *Natural valve motion* . . . fewer parts needed. *Low center of gravity* . . . reduces vibration that can cause piping stress and fatigue. *Safer maintenance* . . . does away with ladders and neck-craning. *Easier maintenance* . . . greater accessibility.

There's a wide selection of top-performing "Oilwell" Triplex and Quintuplex pumps for waterflood applications, LPG Flood, Pressure Maintenance, Formation Fracturing, Acidizing and Cementing, Salt Water Disposal, or you name it. Whatever your requirements, call on "Oilwell" for complete information and help in the planning stage.

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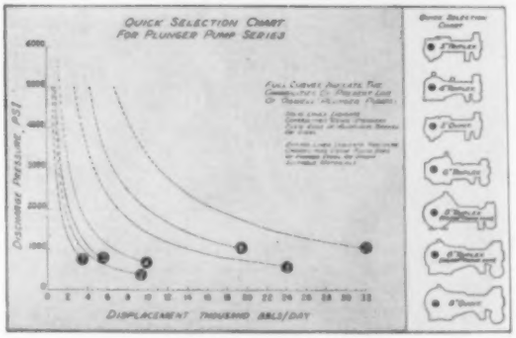

The plunger pump selection manual describes in detail "Oilwell's" complete line of seven primary pumps. Volume-pressure range curves make it a simple matter to pick the pump that's right for the job. Picking plunger sizes is simple, too, because you'll find complete performance data for all plunger sizes available with each size pump.

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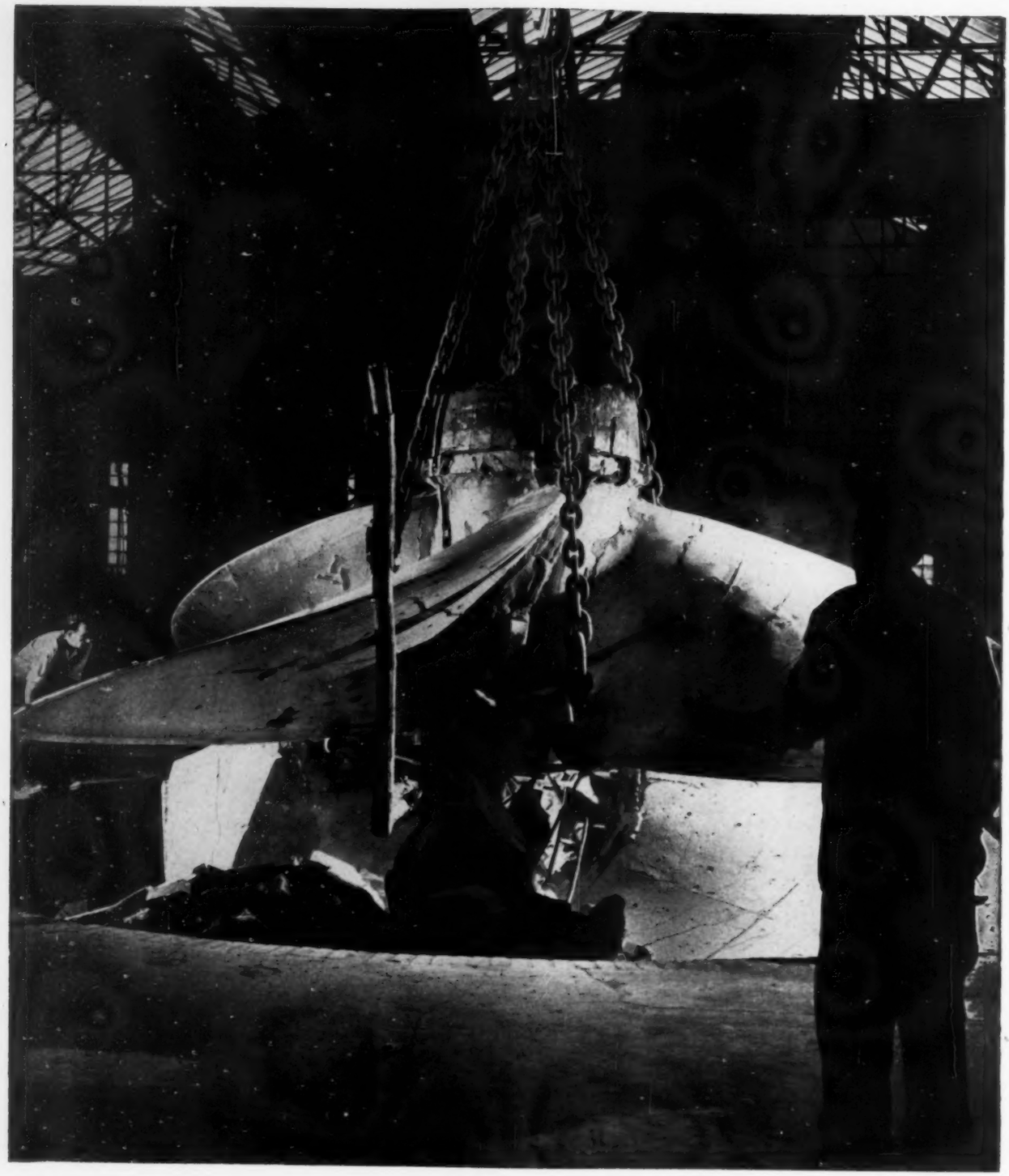

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OIL COMPANY STAFF CHANGES

W. L. Owen

J. W. Johnstone, Jr.

WILLIAM L. OWEN has been appointed general counsel of the Arabian American Oil Co. effective July 31. He succeeds George W. Ray, Jr., who will act as a consultant. Mr. Owen joined Aramco's Law Department in 1951 after having served as counsel for the Trans-Arabian Pipe Line Company. He was an associate with the law firm of Donovan, Leisure, Newton & Lumbard in New York from 1937 to 1939 and later was a member of Hinton & Heron, Washington, D. C., until 1947. He will continue to make his headquarters in Dhahran, Saudi Arabia.

MARCELO CARLOS GALAR has been named director general of Argentina's state oil agency, Yacimientos Petroleros Fiscales. Galar, formerly manager of YPF refinery in Buenos Aires Province, replaces interim appointee **EMILIO J. DIAZ**, a naval captain who remains as director of the navigation section. The post was resigned some months past by Dr. Arturo Sabato, now assistant to the Fuel & Power Minister.

LEWIS W. MacNAUGHTON and **J. EDGAR HESTON** have been elected members of the Board of Cities Service Co. Mr. MacNaughton is chairman of DeGolyer and MacNaughton; Dallas, Texas. He entered the petroleum industry as a geologist with Humble Oil & Refining Co. in 1926. He became a partner in the petroleum and geological consulting firm of DeGolyer and MacNaughton in 1939 and was named president in 1949. He has been chairman since 1956.

Mr. Heston is president and a director of Cities Service Petroleum Co., Bartlesville, Oklahoma, a company engaged in all phases of the petroleum business except marketing.

DR. R. W. WINKLER has been appointed operations manager in the supply department, Esso International.

JAMES W. JOHNSTONE, Jr., has been named assistant to the president of The Atlantic Refining Co. He succeeds **LESLIE A. WEBB**, who was recently appointed manager of the firm's corporate planning services.

MICHAEL P. ROLLICK has been appointed manager for Mobil International Oil Company's Caribbean and Latin America region.

ANSELMO PINTO BASTO, retired chairman of Mobil Oil Portuguesa, has been made a grand officer of the Order for Industrial Merit by the Portuguese government.

LOWELL B. TAYLOR, administrative manager at Salt Lake City, Utah, for American Oil Company, was appointed treasurer of Standard Oil Company (Indiana), effective Aug. 1. American Oil is the nationwide marketing and refining affiliate of Standard Oil (Indiana).

ROBERT G. LEINROTH has been named assistant to the vice president and general manager of marketing at the Atlantic Refining Co.

DR. 'ABD AL-HADI HASAN TAHIR has been named director general of Saudi Arabia's Ministry of Petroleum and Mineral Resources.

RUDOLF G. SONNEBORN has been elected chairman of the board of Sonneborn Chemical and Refining Corp. and William Wishnick as president and chief executive officer. Sonneborn is a wholly-owned subsidiary of Witco Chemical Co., Inc., and constitutes its largest manufacturing division.

WILLIAM D. FRISCHEMEIER has joined the Petrochemicals Department of the Gulf Oil Corp. as a member of the commercial planning section.

JAMES F. DEAN has been elected a vice president of Creole Petroleum Corp., affiliate of Standard Oil Co. (New Jersey) in Venezuela. Mr. Dean is manager of the export sales department of the Creole-New York office and will continue to serve in this capacity.

FRED L. HARTLEY, of Union Oil Co. of California, has been appointed to the general committee of the division of marketing of the American Petroleum Institute.

WILLIAM N. FARLIE has been named coordinator of advertising and sales promotion at New York headquarters of the Esso Standard Region, Humble Oil & Refining Co.

PAUL B. WEISZ has been appointed senior scientist, the highest scientific position in Socony Mobil Oil Co. He is with the research department's laboratory in Paulsboro, N. J. The post of senior scientist is held only by researchers with outstanding ability in originating and carrying out long-range research. It leaves them free to conduct original research with a minimum of administrative responsibilities. Only two other employees hold the title. Mr. Weisz has been awarded 26 U. S. patents for discoveries involving catalytic processes, geophysical prospecting methods and improved Geiger counter tubes, among other areas.

P. B. Weisz

J. S. Baldwin, Jr.

JAMES O. SANDERS has been appointed executive vice president of Paragon Oil Co., Inc. Paragon, a subsidiary of Texaco Inc., markets fuel oil throughout the Eastern Seaboard states and also manufactures oil burners.

ERNEST R. STEVENS has joined Socony Mobil Oil, Inc., as manager of the foreign audit department. He will provide auditing staff service to the company's international division, and will be headquartered in London.

A. C. HAMILTON elected treasurer of Esso International Inc., the international marketing affiliate of Standard Oil Co. (New Jersey). He succeeds **R. B. STOKKE** who will continue to serve as a director.

BERT P. EASTIN has been named vice president for production of Shell Oil Co. Since 1958 he has been director of production research in the exploration and production research division of Shell Development Co. Mr. Eastin succeeds **J. E. CLARK**, who recently was appointed executive vice president in charge of exploration and production.

WILLIAM J. TATER has been appointed manager of the special studies division of Socony Mobil Oil Co.'s economics and special studies department.

J. S. BALDWIN, Jr., has been named the manager of the coordination and petroleum economics department of Standard Oil Company (New Jersey). He succeeds **G. T. PIERCY** who has been appointed executive assistant to the president of the company.

DR. ARTHUR L. DOWN has been appointed general manager, Trinidad operations (New York), of Texaco, Inc.

JOHN C. RUDOLPH has been elected president of Banff Oil Ltd., Calgary. He formerly was a director and general manager. He succeeds W. H. Hohag, Jr., who resigned last January.

(*Continued on page* 89)

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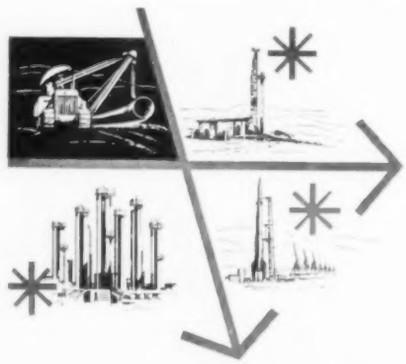

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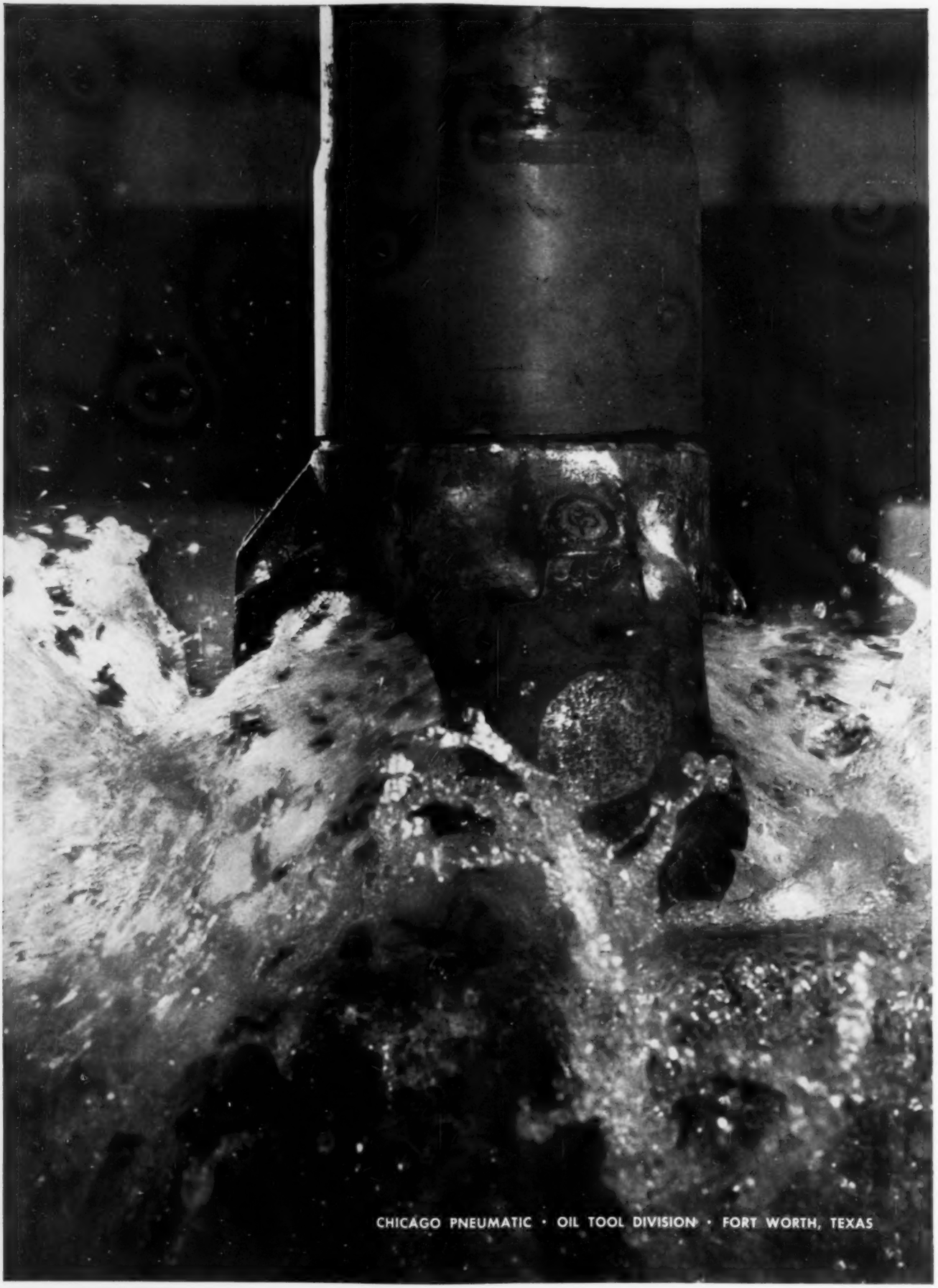
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Oil Company Staff Changes

(*Continued from page 86*)

WALTER LEABO

Walter Leabo, manager of the International Drilling Co.'s Gach Saran Division near Abadan, Iran, passed away July 5, 1961 as the result of a heart attack. Since May 1957, he had been associated with IDC in Kuwait, in Libya, and in Iran. Forty-eight years old, Leabo was born in Shreveport, Louisiana. He studied at Southwestern (La.) Institute and at Northwestern (La.) State College.

He was active in the oil drilling field since March 1938, beginning as a roughneck. He could look back on an interesting career, first with the Texas Co., then with Circle Drilling and Southern Six Drilling Co., Inc., where he was drilling superintendent before he came to work overseas for IDC.

GLEN R. NEIGHBORS

Both the American and international petroleum industry suffered a great loss with the untimely death of Glen Reed Neighbors in an aircraft accident in southwest-central Iran April 17, 1961. In a chartered Iranian airplane with him, and also lost, were Frank Merkle and James Kelly of the Union-Texas Natural Gas Co., Peretz Grader, Petroleum Commissioner for Israel, and the Iranian pilot. The as-yet-unexplained accident took place during a reconnaissance flight on a leg from Nain to Kashan and apparently occurred during a violent thunderstorm in highly rugged mountainous terrain, some 300 kilometers south-southeast of Teheran.

Glen Reed Neighbors was born in Monticello, Arkansas, on December 11, 1917. He received his Bachelor of Science degree in petroleum engineering in 1939 and a Master of Science degree in that same specialization in 1940.

During the last five years of his life, Mr. Neighbors visited most of the oil productive countries in the Western Hemisphere, as well as those of the Middle East, where he was engaged in reservoir studies and economic evaluations of oil properties. He had drilling and production experience in the United States, Mexico, Brazil, Uruguay, Spain, and in Kuwait.

ARMSTRONG A. STAMBAUGH

Armstrong A. Stambaugh, retired chairman of the board of The Standard Oil Co. (Ohio) and a nationally-recognized authority on petroleum marketing, died recently at his Cleveland home. Mr. Stambaugh was Sohio's first senior vice president and he served as chairman of the board of directors from 1950 until 1955.

In 1959, he received the Business Statesmanship Award of the Cleveland alumni of Harvard Business School—the first such award ever given. He also received an award for Distinguished Service from the Ohio Foundation of Independent Colleges in 1957.

He had served as chairman of the board of The Ohio Forestry Association and was a life member of the Board of the Cleveland YMCA. A life member of the American Management Association, he had received its Distinguished Service Award. Vice President of the Cleveland Health Museum, he had been a trustee of the Cleveland Community Fund; campaign chairman for the Cleveland YMCA and YWCA; trustee for the Ohio Foundation of Independent Colleges; honorary director of the American Petroleum Institute and was active in many other civic and charitable organizations. He was a member of the National Industrial Conference Board.

He was the recipient of the Gold Medal for Public Service awarded by the Cleveland Chamber of Commerce.

R. K. van SICKLE

Richard Keith van Sickle, one of the "oil pioneers" in Austria, died in Vienna on July 3, 1961 at the age of 61. He was born in Romania, the son of a British oil man. He received his education chiefly in England. In 1955 he went to Austria, where he obtained concession areas at Neusiedl/Zaya. In 1938 he left Austria, fought with the British troops in Africa, and returned to Austria in December 1945. He resumed the exploitation of his fields which in 1960 yielded 24,000 tons of oil and 42.37 million cubic ft of gas. After World War II, van Sickle became a Canadian citizen.

Earnings Increase 14.9%

Oil company earnings for the first six months of 1961 continued to show the gains registered in the first quarter. On the basis of reports from 51 companies, shown below, earnings have risen 14.9% over the same period in 1960; from $1,360 million to $1,564 million.

Substantial increases were shown for several of the companies: Jersey Standard 22%; Socony 30%; Sun 20%; Cities Service 28%; Atlantic 28% Indiana Standard 14.4%; and Texaco 12.2%. These helped to offset the effects of a number of other companies where earnings had decreased somewhat.

OIL COMPANY EARNINGS—SIX MONTHS
(Totals in $1,000's. Per share is on common)

	1961 six months	1961 per share	1960 six months	1960 per share
Amerada Petroleum	14,141	2.24	13,723	2.17
American Petrofina	820	0.12	(385)[1]	—
Apco Oil	1,743	3.46	902	1.79
Ashland Oil & Ref.[2]	10,712	1.49	9,929	1.38
Atlantic Refining	21,649	2.31	16,917	1.80
Aztec Oil & Gas	2,649	0.92	2,444	0.84
Belco Petroleum	2,013	0.37	1,545	0.29
British American	13,267	0.65	13,730	0.67
Canadian Petrofina	2,675	—	652	—
Champlin Oil & Ref.	5,341	1.25	3,362	0.78
Cities Service	23,919	2.23	18,673	1.74
Clark Oil & Refining	17	0.01	208	0.12
Colorado Oil & Gas	2,152	0.60	(313)	—
Commonwealth Oil	6,100	0.53	1,054	0.22
Continental Oil	28,722	1.34	28,983	1.35
Delhi-Taylor Oil	2,750	0.46	2,150	0.42
Getty Oil	6,810	0.42	4,929	0.28
Gulf Oil	169,701	1.64	156,096	1.51
Hudson's Bay	3,090	0.17	614	0.03
Imperial Oil	29,091	0.92	30,686	0.97
Kern County Land	8,312	1.92	7,272	1.68
Maracaibo Oil Explor.	97	0.20	118	0.24
McCulloch Oil	190	0.02	124	0.01
Midwest Oil	4,129	1.68	3,399	1.36
Ohio Oil	19,300	1.35	17,733	1.28
Olin Oil & Gas	1,865	0.64	1,625	0.56
Phillips Petroleum	54,902	1.60	51,748	1.51
Plymouth Oil	623	0.24	43	0.02
Quaker State	748	0.91	765	0.93
Richfield Oil	9,180	1.13	13,988	1.73
Shell Oil	69,683	1.15	69,312	1.14
Signal Oil & Gas	5,927	0.60	7,604	0.77
Sinclair Oil	23,162	1.52	21,662	1.40
Sinclair Venezuelan	5,451	1.36	6,425	1.60
Skelly Oil	11,813	2.09	11,089	1.93
Socony Mobil	108,800	2.24	83,400	1.72
Standard of Calif.	136,482	2.16	128,589	2.03
Standard of Indiana	74,177	2.07	64,887	1.81
Standard of Kentucky	6,346	2.44	6,958	2.67
Standard of Ohio	11,649	2.33	10,956	2.19
Standard of N. J.	385,000	1.78	315,000	1.45
Sun Oil	24,048	1.84	20,032	1.63
Sunray Mid-Continent	21,916	1.13	18,743	0.95
Superior Oil[3]	17,160	40.71	18,550	43.96
Texaco Canada Ltd.	4,570	1.39	5,565	1.70
Texaco	198,726	3.22	177,342	2.93
Texas Gulf Producing	2,425	0.60	2,414	0.60
Texas Nat'l Petroleum	300	0.08	180	0.05
Texas Pacific Coal & Oil	3,523	0.90	3,968	1.02
Tidewater Oil	14,718	0.94	18,277	1.16
Union Oil of Calif.	16,771	1.92	13,370	1.53
Universal Consolidated	1,997	2.11	1,227	1.28
Wilcox Oil	383	1.16	446	1.39
Totals	1,563,863		1,360,231	

[1] Figures in parentheses are net losses.
[2] For 9 months ending June 30. Excluded from totals.
[3] For 9 months ending May 31. Excluded from totals.

Big Independent or Little Major?

Signal Oil & Gas, as part of its program toward complete integration, has already acquired three companies: Hancock Oil, Bankline Oil, and Eastern States Petroleum & Chemical Corp. The latter should help take care of its future crude production in Venezuela, as well as its Iranian and Kuwait output. Signal has important oil concessions in Venezuela's Lake Maracaibo; is 30% owner of American Independent Oil Co., which operates in Kuwait; is 1% owner in the Iranian oil consortium; and is actively prospecting in Bolivia, Argentina, Guatemala, and the USA. It is now moot whether Signal is the West's largest independent or a small major. Within 18 months its sales have risen to $305 million from $90 million, after acquisition of new refineries, petrochemical facilities, and more than 1,000 outlets. Its net profit for 1960 was $16.3 million; and in the 1st quarter of 1961 rose 21% over the earnings in the first three months of 1960.

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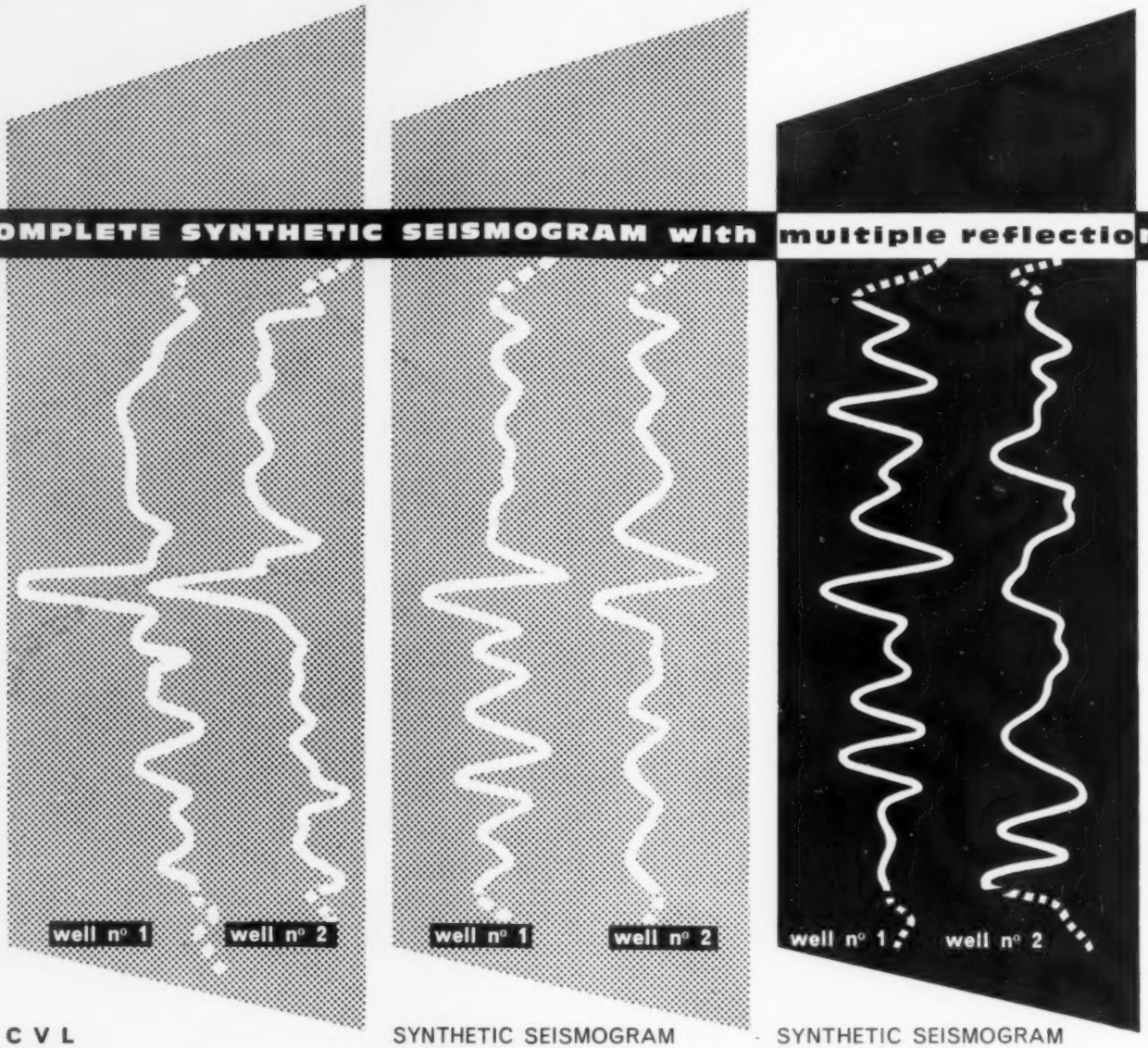

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INTERNATIONAL NEWS AND NOTES

ALASKA—Standard Oil of California et al. encountered gas at 7,600 ft in their 13,795-ft Falls Creek No. 1 Unit in the northern part of the Kenai peninsula. Daily flow of 1,950,000 cu ft of gas at 7,600 ft has been reported.

ALGERIA—As of July 3, Oued Tifist 101 was preparing to core at 7,230 ft; Gara Brune 101 was drilling below 8,507 ft; Oued Ahara 101 (spudded June 1, 1961, about 20 miles northwest of Oued Ahara 101), was drilling below 5,187 ft.

AUSTRALIA—Three more applications, totaling $400,000, have been approved under the petroleum search subsidy act. Frome Broken Hill will receive $125,000 for stratigraphic drilling at Flaxman's Hill, Victoria (Otway basin); Phillips Petroleum and Sunray-Mid Continent will receive $175,000 for seismic surveys in Blackwater-Langlo area, Queensland (Great Artesian basin); and Coronada Petroleum Corp. will receive $100,000 for seismic surveys in Mayne area, Queensland (Great Artesian basin).

AUSTRALIA—Near Tara, Queensland, four miles east of Cabawin No. 1, Union Oil Development Co. expects to drill a 12,000-ft test, Cabawin East No. 1. Drilling contractor is Drilling & Exploration, Ltd.

AUSTRALIA—Bureau of Mineral Resources, of Canberra, will make gravity surveys in inland Australia. Two chartered helicopters will move the party about 50,000 miles in 18 weeks in the search for commercial oil regions in Northern Territory, Western Queensland, and South Australia. Before the end of 1961, the party is to cover an area of 100,000 square miles.

AUSTRALIA—Delhi Australian and Santos Ltd. have completed their second stratigraphic on Mornington Island. Basement rocks were encountered at 3,000 ft. and the hole has been plugged and abandoned. The drilling rig and auxiliary equipment have been returned to the mainland of Australia pending formulation of further exploration programs in the Gulf of Carpentaria sedimentary basin.

AUSTRALIA—A group of Australian oil exploration companies has called on the government to set up a $55 million fund to subsidize their efforts. The group, the Australian Petroleum Exploration Assn., suggested that the money in the fund should be used to contribute on an equal basis towards seismic exploration work and drilling. Thirteen independent oil exploration companies formed the association two years ago.

AUSTRALIA—Since the beginning of federal subsidies in 1957, the Australian government has paid out $5 million, and is committed to another $4 million. Expenditures for oil exploration in Australia and New Guinea amounted to about $16 million in 1959, and were even higher in 1960.

AUSTRALIA—BP Australia Ltd will erect a $300,000 bulk oil installation at Eden, on the far South Coast of N.S.W. Construction will begin soon, and the installation is expected to be in operation by next March. It will have a storage capacity of more than 2.5 million gallons of gasoline and diesel fuel, and will include two gasoline blending tanks and a benzol storage tank. Eden will be the company's distribution center for customers on the coast from Moruya, N.S.W. to Orbost, Victoria, and inland as far as Cooma. The Snowy Mountains Hydro Electric Authority, which obtains all its fuel requirements from the company, will receive its supplies from Eden.

AUSTRALIA—H. C. Sleigh Ltd. has bought a 10% undivided interest in Associated Oil group's prospecting area for nearly a million dollars. Interstate Oil purchased 15% for $2,500,000. Area held by the group exceeds 125,000 square miles in Queensland. It includes the Surat basin near Roma, where the latest oil well encountered shows of oil and gas.

AUSTRALIA—Phillips Petroleum Co. plans a petroleum marketing operation in Queensland and northern N.S.W. It will build an oil terminal at Pinkenba in Brisbane and a chain of service stations to sell a new brand of gasoline. Half of the initial share capital of $2 million will be offered to the Australian public in 50-cent shares. Phillips will provide the other 50%. In addition an issue of nearly $1 million 9% first-mortgage debentures will be made in Australia.

Chairman of the Australian company, Phillips Oil Products Ltd., is the former Deputy Prime Minister and Federal Treasurer, Sir Arthur Fadden. The new brand of gasoline will be Phillips 66. The oil terminal and service stations are to be completed by the end of 1961.

AUSTRIA—OeMV's Wildenduernbach gas field, notable for its being the first gas deposit in Austria located outside the Alpine region of the Vienna Basin (Molasse zone), started producing. Its counterparts are the gas deposits in the Bavarian foothills of the Alpine region (Isen, Weitermuehle, Wolfsberg), some of which are already in production. Prospects for further oil or gas finds in the Austrian part of the Molasse zone are considered good.

BELGIUM—Sinclair Oil is moving to extend marketing operations of branded products in Europe. A newly-formed affiliate abroad, Sinclair Belgium SA, has entered long-term agreement to supply oil products to the Combulic group, an established Belgian distributor.

BOLIVIA—Chaco Petroleum SA (Tennessee Gas Transmission Co. subsidiary) found gas condensate or oil in two zones in Algarrobille No. 1, a 12,890-ft discovery on TGT's 443,400-acre lease held jointly with Union Texas Natural Gas, Lion Oil, and Murphy Corp. Well is 40 miles north of the Bolivian-Argentine border city of Yacuiba. Production potential will not be known until final testing.

BOLIVIA—The USA has offered Bolivia's sinking economy an aid package worth almost $50 million, bringing USA assistance to $201.4 million over the past decade. The funds have been earmarked for road building, sugar mills, airports, tin, and oil development.

CHINA—Crude production in 1960, amounting to 5.5 million tons (about 110,000 b/d), was up 48.6% over the previous year's level of 3.7 million tons. Oil fields have been developed in Yumen, Sinkiang, Szechwan, Tsaidam, and other regions. Tsaidam is called the "Chinese Baku" because Soviet and Chinese geologists have thus far discovered 110 oil-bearing formations. Mongolia during 1961 is slated to produce 28,000 tons of crude.

COLOMBIA—Forest Oil Corp. of Bradford, Pa., which for five years has been conducting a secondary-recovery project in the DeMares region, will receive $6 million from Ecopetrol (Colombian government oil agency) for termination of the project which would have another 25 years to go.

COLOMBIA—Hailed as one of the country's most promising wells in years is Colombia-Cities Service Petroleum Corp.'s recent discovery, Payoa No. 1 in the middle Magdalena Valley, some 160 miles north of Bogota. Dually completed, the well tested at total rate of 5,410 b/d from five zones.

EGYPT (UAR)—Cie. Orientale des Petroles d'Egypte has found a second pay zone at 9,265 ft in an extension to the Belayim field offshore Egypt's Sinai peninsula. The well's total test flow has been doubled to 3,780 b/d.

FRANCE—Cie. Financiere de Suez, defunct French operator of the expropriated Suez Canal Co., has joined Kidder Peabody & Co. (American investment bankers) for cooperative development of new international opportunities. The reconstituted canal company has become one of the most influential financial institutions in the European Common Market area.

GABON—Mobil's Well Pambo N'Yango 1, as of July 3, was drilling below 5,371 ft.

GERMANY—On a long-term contract, Continental Oil early in 1962 will begin supplying 20,000 b/d of its Libyan crude to Deutsche Erdoel's Heide refinery and to another DEA-owned plant at Karlsruhe.

INDIA—Indian government is reported to have reached agreement with Burmah Oil Co. for exploration by the latter with 50% government participation in exploration. The Shell affiliate and government officials also are reported to have settled on details of marketing and refining rights.

INDIA—Indian government reports that, with Russian assistance, oil has been found at Kalol in Gujarat state, about 80 miles from the Cambay find. No production results have as yet been announced except that perforation testing resulted in oil flowing smoothly from first well. Oil & Natural Gas Commission has decided to carry out an intensive oil search in about 400 square miles around Kalol.

(Continued on page 94)

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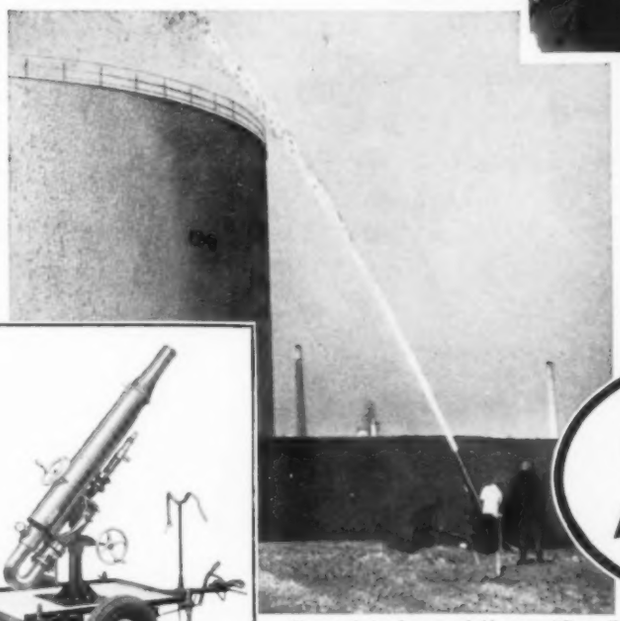

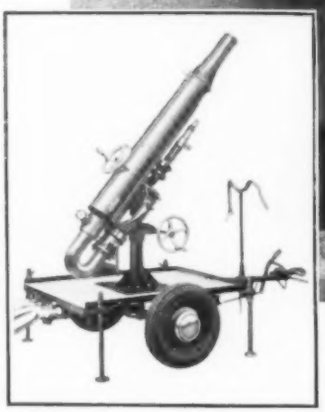

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(*Continued from page 92*)

IRAN—Iranian Oil Exploration & Producing Co. has announced Ahwaz well No. 8, on the Kurait structure, is now producing at the rate of 26,000 b/d—first big producer after 46 years. Ahwaz No. 6, now producing 6,800 b/d, is the well which in 1958 was on fire for 65 days before it was brought under control.

JAPAN—Demand during 1960 by Japanese refineries and chemical plants for LPGas rose to something under 4½ million barrels—with demand rising. During 1961, LPGas imports will be about 1,728,000 bbl, to rise to some 3,608,000 bbl by 1963. By year-end 1961, Japan will be making large-scale imports of refrigerated LPG from the Middle East.

KUWAIT—Kuwait Oil Co., as of mid-July, reopened 27 oil wells near Kuwait's Iraqi border which had been closed down two weeks earlier when British troops arrived to protect Kuwait from the threat of annexation by Iraq. This appeared to signal the crisis was over, though Iraq's premier Kassem continued to demand that British troops evacuate Kuwaiti soil. Expressing dissatisfaction with the attitude of other Arab countries, Kassem proposed an Arab army to replace British troops.

LIBYA—For mid-1962 completion, Oasis Oil Co. of Libya has awarded to Libyan Engineering & Construction Co. and Arabian Bechtel Corp. contract for construction of a large-diameter 30-in. pipeline and deep-water terminal. Line will extend from the Dahra and Mabruk fields in eastern Tripolitania to the proposed terminal at Es Sider on the Gulf of Sirte.

LIBYA—Mobil's wells: As of early July, Rachmat F1-13 was drilling below 11,709 ft; Lidam B1-57 was 4,405 ft, with rig being repaired; Neggaza C1-57 (spudded June 22, some 25 miles southeast of El Gattar A1-57) was at 660 ft.

NEUTRAL ZONE—American Independent Oil Co., holder of concession rights over the onshore area of Kuwait's half of the Neutral Zone, has new concession arrangement. Profits are to be divided 57-43 with the government on a "realization" basis, or 50-50 if posted prices are used.

NIGERIA—Gulf Oil, American Overseas, and Mobil all have applied for exploration acreage offshore Nigeria. Mobil Exploration Nigeria has applied for two tracts covering about 2,000 square miles in the Niger delta area east of Port Harcourt.

NORWAY—Caltex Oil Co. (USA) will begin another round of prospecting in the Spitzenbergen archipelago of the bleak islands of the Arctic Sea, where 200 claims were filed during 1960.

PERU—Mobil's well Aguaytia 1 was preparing to core at 7,584 ft as of July 3, 1961.

QATAR—Crude oil production by the Qatar Petroleum Co. in the first three months of this year was 2,037,906 long tons. Exports were 2,049,909.6 long tons.

SAUDI ARABIA—Shut in for 21 years with two wells, the Abu Hadriya field will be opened to commercial production by October of 1962. With $2,350,000 budgeted for project by Arabian American Oil, initial output of 50,000 b/d is slated to come from seven wells in Arab "A" and "B" zones and from mid-Jubaila and Hadriya zones. Abu Hadriya will be Aramco's seventh producing field.

SPAIN—USSR and Spain have concluded first substantial oil trade agreement: an exchange of 40,000 tons of Soviet crude for 2,200 tons of Spanish textile fibers. Contract was negotiated through Belgian intermediaries; Spain has no diplomatic relations with Soviets.

SYRIA—Under UAR's present Five-Year Plan, $85 million has been earmarked to make Syria an oil exporter by 1963 or 1964.

TURKEY—Mobil International has made a dry-hole agreement with the State-owned Turkish Petroleum Co. for a wildcat now being drilled near Batman in eastern Turkey. Mobil has agreed to pay $7.00 per foot drilled, but not more than total $40,000.

TURKEY—Mobil's drilling, as of early July, Akyar 1 was at 7,401 ft; Siraseki 1 (spudded June 27, 10 miles west-southwest of Ceyhan 1) was at 1,471 ft; Mersin 1 was abandoned on June 20 at 4,552 ft (rig skidded to Siraseki 1 location).

USSR—A 475-mile section (from Dzharkak field to Bukhara) of a natural-gas pipeline network has been completed. It is part of a 4,000 to 5,000-mile line eventually to be built in central Asia with Bukhara as the hub.

UNITED STATES—Gulf Oil Corp. has earmarked approximately $400 million for "continued improvement and modernization of plants and the construction of new facilities" in 1961. Texaco will spend approximately $3 billion over the next five years for capital items and exploration. The 1961 budget will be about the same as the $521 million spent in 1960. Looking ahead to the end of the sixties, Socony's president Nickerson declared "we expect demand for petroleum energy to grow faster than the increase in demand for all forms of energy."

UNITED STATES—A preliminary amicable agreement has been reached between U. S. Interior Dept. and representatives of Mexico's nationalized oil industry for limiting to 30,000 b/d imports of oil into the USA from Mexico under the USA mandatory import plan. This is the level of sales of residual fuel oil which Pemex originally had been making to Texaco Inc. (until the latter ended the arrangement) under the so-called Brownsville plan. Under the plan, in 1960 imports were shipped to Texas by tanker, transported in bond to Mexico, and then reshipped back into the USA as quota-free overland imports. A mere trickle at the beginning of the year, these imports rose to about 15,000 b/d, but they now average about 43,000 b/d. Interior regards this level as possibly endangering the national oil imports program.

(*Continued on page 98*)

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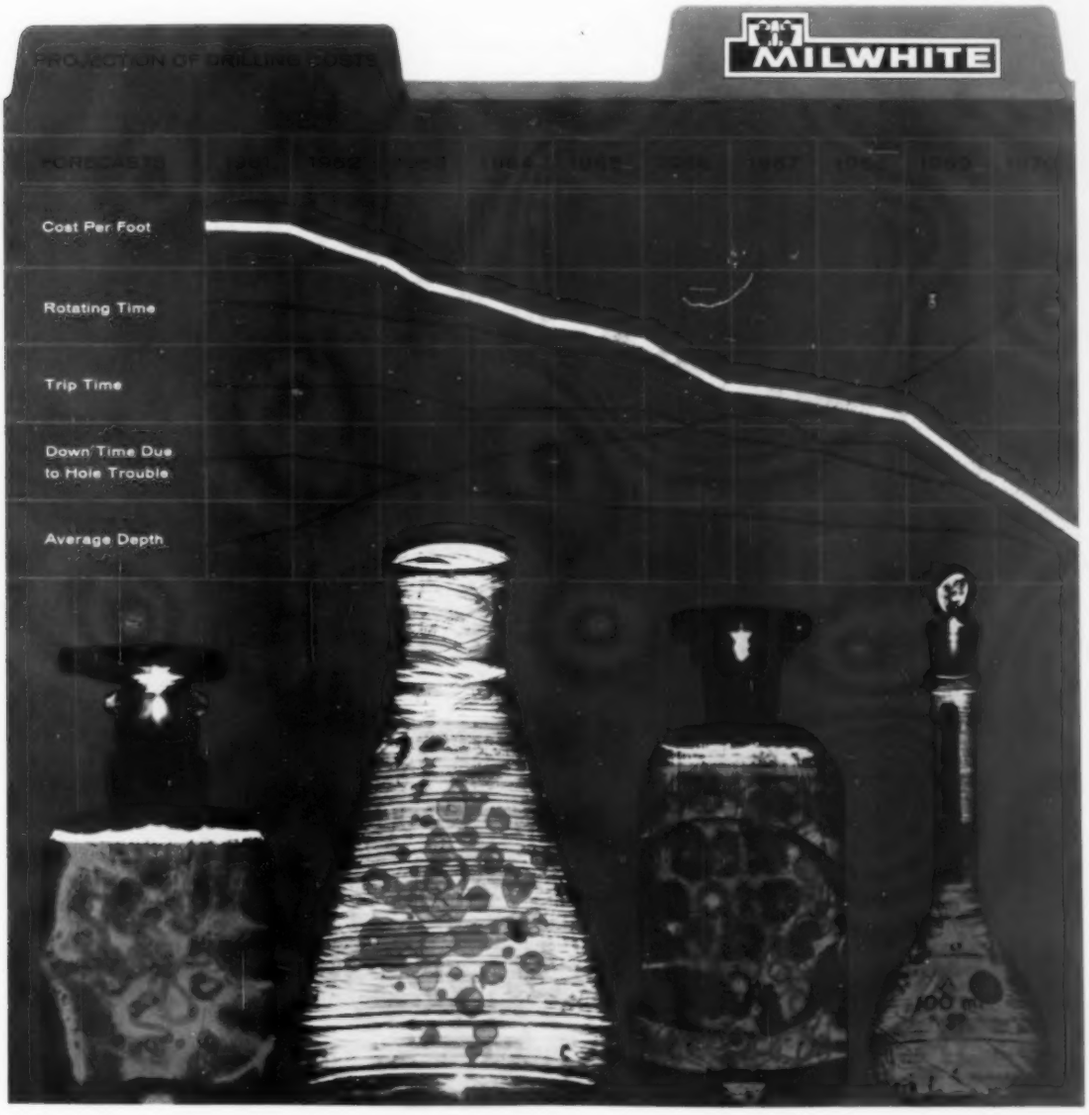

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33 GROSVENOR PLACE, LONDON SW1

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Ready to serve you anywhere on the globe

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Consolidated Safety Relief Valves
Hancock Steel Gate and Globe Valves
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Dewrance & Co. Ltd., London
Ashcroft Duragauges
Ashcroft Pneumatic Transmitters
Consolidated Safety Relief Valves
Consolidated Safety Valves
Consolidated "Maxiflow" Safety Valves
Consolidated "Electromatic" Relief Valves

IN BELGIUM

Ateliers Jasper, S.A., Liege
Consolidated Safety Valves

IN CANADA

Manning, Maxwell & Moore of Canada, Ltd., Galt, Ontario
Ashcroft Gauges
Consolidated Safety and Safety Relief Valves
Hancock Bronze and Steel Valves
American Bi-Metal Thermometers
American Temperature Regulators

IN AUSTRIA

Hubner & Mayer, G.m.b.H.
Consolidated Safety Relief Valves
Consolidated Safety Valves

IN ITALY

Societa Carraro & Co., Milan
Consolidated Safety Valves
Hancock Temperature Regulators
Filotecnica Salmoiraghi—SPA, Milan
Ashcroft Duragauges

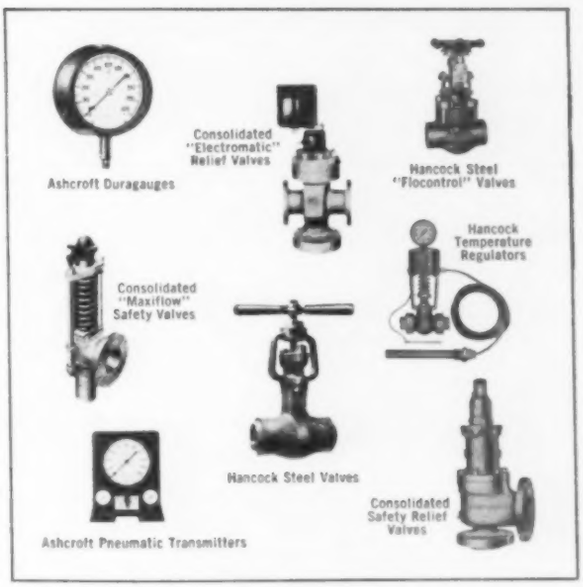
IN WESTERN GERMANY

Deutsche Babcock & Wilcox Dampfkessel-Werke, Oberhausen (Rheinl)
Consolidated Safety Relief Valves
Consolidated Safety Valves
Consolidated "Maxiflow" Safety Valves

Demand by the petroleum industry for world-wide application of our pressure gauges, industrial instruments and valves is now being met by our licensees in England, France, Belgium, Western Germany, and Italy. Payment in the currencies of those countries.

These licensees are manufacturing our brands of measurement, transmission and protective devices to the same standards of quality and performance that have earned high preference from the petroleum industry in the United States, Canada, and Latin America.

Whether you are planning new facilities or upgrading existing processes, your most exacting requirements in instrumentation and valves will be met by our licensees. They welcome the opportunity to assist you with experienced counsel and specific product information. Or write us direct.



MANNING MAXWELL & MOORE INC. TRADE MARK

MANNING, MAXWELL & MOORE, INC.

All Areas Except Western Hemisphere: Manning, Maxwell & Moore, S. A., Fribourg, Switzerland
Canada: Manning, Maxwell & Moore of Canada, Ltd., Galt, Ontario
Latin America: Export Division, Chrysler Bldg., New York, N. Y.

(*Continued from page 94*)

UNITED STATES—Representatives of eight major oil companies have organized new company, Dixie Pipeline Co., to build a 50,000 b/d 1,100-mile pipeline to transport liquified petroleum gas from Texas and Louisiana to the Southeast. Line is expected to begin delivering propane to customers next winter. Contracts for design, engineering, and construction management have been awarded to Service Pipe Line Co. (Indiana Standard affiliate) and to Phillips Petroleum.

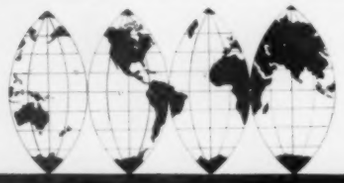
VENEZUELA—Financial circles say it's wishful thinking to suggest that Creole Petroleum Corp.'s tax problems with Venezuela will be eased by its move to set up a $10 million subsidiary there to invest in activities other than oil. This may, however, forestall further Venezuelan pressure on Creole.

VENEZUELA—Crude-oil output for the first quarter of this year was 3,026,000 b/d, a gain of 5.7% from a year earlier.

VENEZUELA—Mobil well, MOB 349.1 in the Maracaibo district, spudded June 17, 1961, was drilling below 10,227 ft as of early July.

YUGOSLAVIA—The current 5-year plan (1961-1965) provides for considerable increases in all fields of the petroleum industry. Crude reserves are presently estimated at 27 million tons, chiefly due to the discovery of new deposits at Struzec, and Boku in 1958, Ferdinandovac, Pitomaca, Elemir, Konak, and Kikinda in 1959, and Lopovljana in 1960. Crude production is to rise from 941,121 tons in 1960 to 2.2 million tons in 1965; the regional distribution of the increase is to be: Slovenia, from 15,780 tons (1.7%) to 95,000 tons (4.4%), Croatia, from 768,028 tons (81.6%) to 1,459,000 tons (68.2%), and Serbia, from 157,313 tons (16.7%) to 585,000 tons (27.4%).

Gas reserves are estimated at 10 billion cubic meters (35.31 billion cubic feet). Planned yield in 1965 is 400-600 million cubic meters (14.1-21.2 billion cubic feet), against 55 million cubic meters (1.94 billion cubic feet) in 1960.



The sun never sets on Petty crews. Below is an advertisement which is appearing currently in an Australian publication in conjunction with full scale surveys being carried out by Petty crews in Queensland and New South Wales. Petty crews work around the clock, around the world.

Petty
GEOPHYSICAL ENGINEERING CO.
30 TANK STREET, P. O. BOX 195
NORTH QUAY, BRISBANE, QUEENSLAND

Capability and efficiency, supported by continual experience since 1925, are now being applied by Petty crews to full scale surveys in Queensland and New South Wales. Petty applies traditional seismic, gravity, and magnetic methods as well as such advanced techniques as the patented Petty principle of horizontal stacking. Adequate supervision is granted from strategically located offices in Quilpie and Brisbane, Queensland and Wallacia, New South Wales, Australia; Bogota, Columbia; Denver, Colorado; Lafayette, Louisiana; Irwin, Pennsylvania; and the home office in San Antonio, Texas.

Gets Higher Import Quota

Federal government has granted a higher crude-oil import quota to Texaco Inc. in a decision which could result in raised allocations for 27 other refineries in the West. Claiming that Interior Dept. last year improperly changed the procedure for estimating future oil demands upon which quotas are based, Texaco was granted a 770 b/d increase in its previous allocation of 140,885 b/d.

National Security Potential

Humble Oil & Refining's president Morgan J. Davis, a prominent geologist, recently told a Senate committee that 70 billion barrels of new crude oil alone could be obtained from USA fields through extension drilling and improved recovery and from new discoveries on acreage already under lease. In the first 102 years of the industry's history crude production has been only 65 billion bbl which, plus the 31,600,000,000 bbl of reserves on hand at year-end 1960, means more than 96 billion bbl of reserves have been discovered since the Drake well in 1859.

"In 1956," said Mr. Davis, "the US Geological Survey concluded that a reasonable figure for oil ultimately to be recovered from the USA and adjoining continental shelves might be 300 billion bbl, or about three times the estimates of the amount of oil discovered to date." Crude production in the USA, added Mr. Davis, has averaged just short of 2½ billion bbl a year since 1955.

Murco Libya Formed

Murco Libya Oil Co. filed a charter of incorporation, June 26, with the corporation department of the Secretary of State's office, Dover, Delaware. Authorized capital stock of the firm is $500,000. Corporation Trust Co., 100 West 10th St., Wilmington, Del., is serving as the principal office.

New Australian Company

Austral Oil & Gas Exploration Corp. filed a charter of incorporation, June 26, with the corporation department of the Secretary of State's office, Dover, Delaware. Authorized capital stock of the firm is $30,000. Corporation Trust Co., 100 West 10th St., Wilmington, Del., is serving as the principal office.

Whitestone Developing Program

Whitestone Petroleum Corp. of New York, N. Y., seeks to register $3,000,000 of participating interests in its oil exploration and development program.

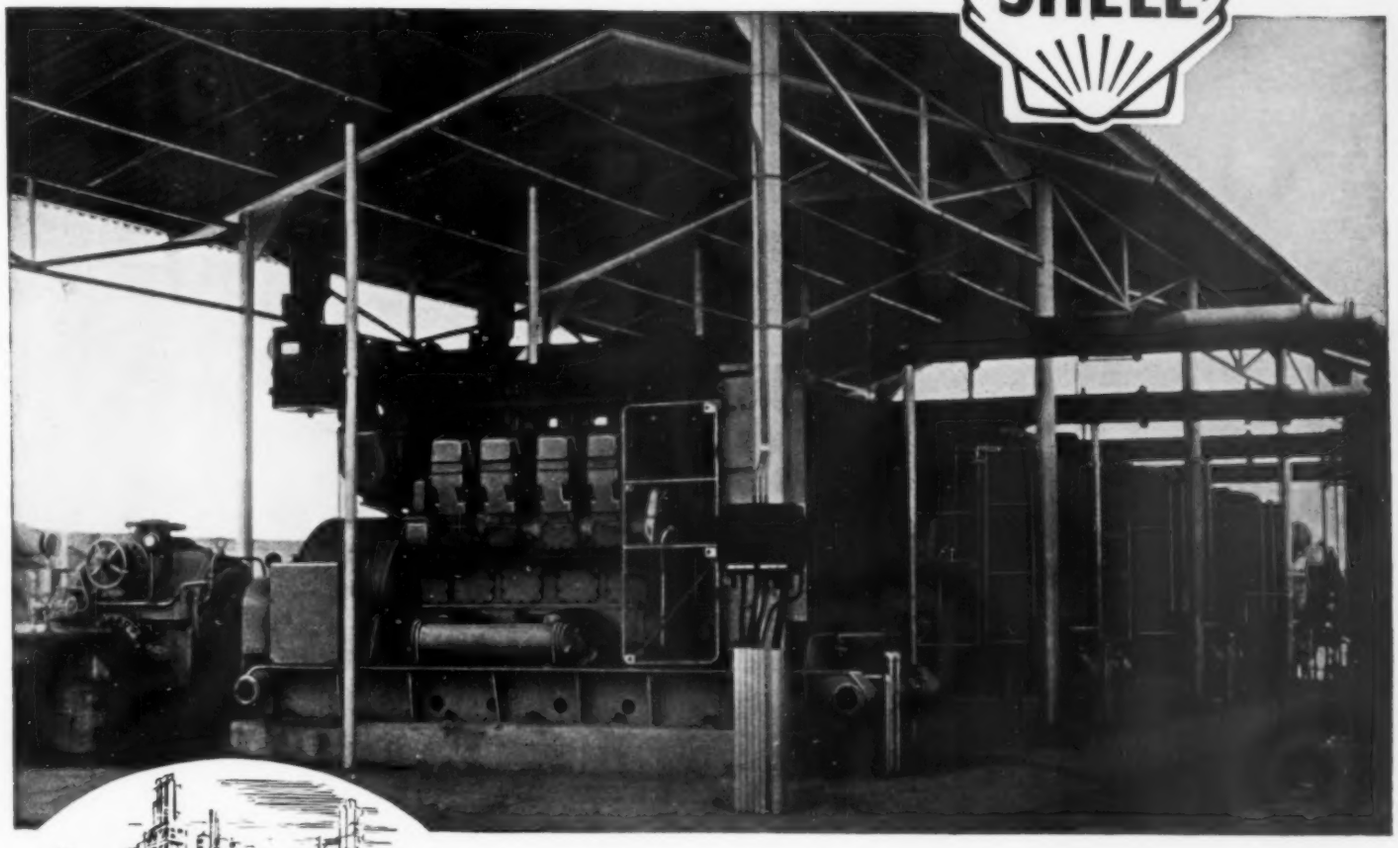
Proceeds will go to find and screen deals to develop prospects for drilling, testing, completing and equipping or plugging and abandoning wells and for other costs. Chief activity is expected to center in the Gulf Coast and Mid-Continent regions of the U.S.

In addition to certain debts and preferred stock, the company has outstanding 1,000 shares of common stock, all of which is owned by George F. Clements, Jr., the president.

Terms Bustani Article Fairytale

Emil Al-Bustani's article "Soviet Petroleum Threatens the Middle East" in a recent issue of WORLD PETROLEUM, described as the "magazine of oil kings," was termed in a Radio Moscow broadcast to Arab countries a "fairytale needed by the U. S. and British imperialists to drive a wedge between the Soviet Union and the Arab countries with regard to the export of petroleum." Al-Bustani's conclusion that Soviet petroleum exports are a threat to the oil-exporting Arab countries were refuted in the June 1 broadcast as "fantastic." The speaker said that during the past 5 years Soviet petroleum exports to "capitalist" countries had increased by 15 million tons, but by no means, he argued, at the expense of Arab countries as Middle East petroleum exports during the same period had increased by 100 million tons. "The need for liquid fuel throughout the world is increasing at such a pace that the appearance of Soviet oil on foreign markets is causing no harm to any producer of liquid fuel," the speaker soothed and asserted that this trend will continue in the future. "Furthermore," he continued, "there is another reason why the fast increase of Soviet oil production need not worry exporters: the greater part of the increase in oil production in the USSR will be consumed domestically in view of the very fast development of the Soviet economy."

Packaged pumping power for SHELL



Four 'ENGLISH ELECTRIC' 8SV diesel engine package sets are on duty at the Puerto Miranda loading terminal of Cia. Shell de Venezuela Ltd. These sets, each with a continuous site output of 655 b.h.p. at 720 r.p.m., drive positive displacement pumps through hydraulic couplings to deliver the crude oil to tankers. The speed of the pumps can be varied between 290 and 720 r.p.m.

'ENGLISH ELECTRIC'

diesel engines

THE ENGLISH ELECTRIC COMPANY LIMITED, ENGLISH ELECTRIC HOUSE, STRAND, LONDON, W.C.2

Offices and representatives throughout the world

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NGAA Becomes NGPA

On July 1, 1961 the Natural Gasoline Association of America officially changed its name to "Natural Gas Processors Association" and the familiar NGAA symbol became NGPA.

Because many NGAA publications, technical standards and test methods have long been used in business transactions, the new editions will continue to carry the old NGAA insignia as well as the new NGPA for cross identification.

Texaco Splits Stock

Texaco Inc. has announced a two-for-one split of the company's capital stock. Texaco's authorized capital stock was increased from 75,000,000 shares with a par value of $25 to 150,000,000 shares with a par value of $12.50.

The record date of the split was fixed as July 19, with new certificates for additional shares to be mailed out beginning August 10. No outstanding certificates should be returned, but should be retained by stockholders.

Oil's Margin Narrows

Pacific Gas & Electric Co., in proposing a $61 million 325,000-kw nuclear power plant near San Francisco, claims it has reduced the cost of atomic power. Part of the credit for the fact that atomic power is more competitive goes to PG&E's technical refinements; part belongs to the increased cost of oil.

Gas-Heated Homes on the Up

Am. Gas Assn. estimates gas-heated homes in 1960 increased by 1,171,000, or 5.8% over 1959. Gas-heated homes at year-end numbered 21,352,000. New construction accounted for 62% of the 1960 installations; 38% represented conversions of home-heating units from other fuels.

SANTA FE DRILLING COMPANY

P. O. Box 310

WHITTIER, CALIFORNIA

Cable "SFEDRLCO"
Whittier, California

Telephone
OXford 6-1175

Why Gas Regulation Spreads

In the two decades since passage of the 1938 natural-gas act, USA pipelines have sprouted until today there are more than twice as many miles of interstate and intrastate gas pipelines as miles of railroad track. In 1938, gas was considered mostly a nuisance to be flared in the field as a waste product. Recent contract prices for gas at the well head have been bid up to as high as 20¢ per MCF in Texas, 24.6¢ in Louisiana, 30.5¢ in West Virginia, and 33¢ per MCF in Pennsylvania. When the first pipelines to move gas to major fields were constructed, producers often were glad to sign 20-year contracts for as little as a few cents per MCF. Government philosophy now is toward increasingly firm regulation of both the 120 interstate pipeline firms and the thousands of gas producers (of which some 270 are rated major suppliers). Currently more than 100 pipeline rate increases are pending before the Federal Power Commission.

USA Oil Earnings up in '60

Although earnings of a group of 32 of the largest U.S. oil companies in 1960 continued to recover from the low point reached in the recession year 1958, they still failed to measure up to the pre-recession level. This was revealed in an annual report on the petroleum industry by The Chase Manhattan Bank.

The 16th annual survey, prepared by Frederick G. Coqueron, analyst in the bank's petroleum department, showed that the 32-company group's net income totaled $2.9 billion, an increase of $213 million. Approximately 67% was derived from domestic operations.

Cash dividends paid aggregated $1.5 billion, which was slightly higher than in 1959. However, the stockholders' share of the available earnings declined from 53% in 1959 to about 50% disbursed in 1960. The combined tax levies of United States and foreign governments in 1960 totaled $6.8 billion, 4½ times the dividend payments to shareholders.

The rise in the group's earnings is attributed to several factors, including a 7% increase in the worldwide consumption of petroleum. Gains for crude oil production and refinery operations were similar. Despite the rise in consumption, crude oil availability continued excessive as a result of further development of resources in both established and new areas.

According to the report, capital expenditures of the group declined slightly to $4.2 billion in 1960. Of this outlay, 75% was made in the United States. The year 1960 saw a further decline in the rate of return on overseas investments, a trend that has been in progress for several years.

World's Laid-up Tankers

Statistics issued by the Chamber of Shipping of the United Kingdom show the following broad changes over the last four months available in tanker shipping laid up for lack of employment (in 1,000 gross tons):

1961	*World*	*British*	*USA*
June 1	2,293	424	280
May 1	1,864	401	260
April 1	1,734	372	255
Mar. 1	1,719	362	245

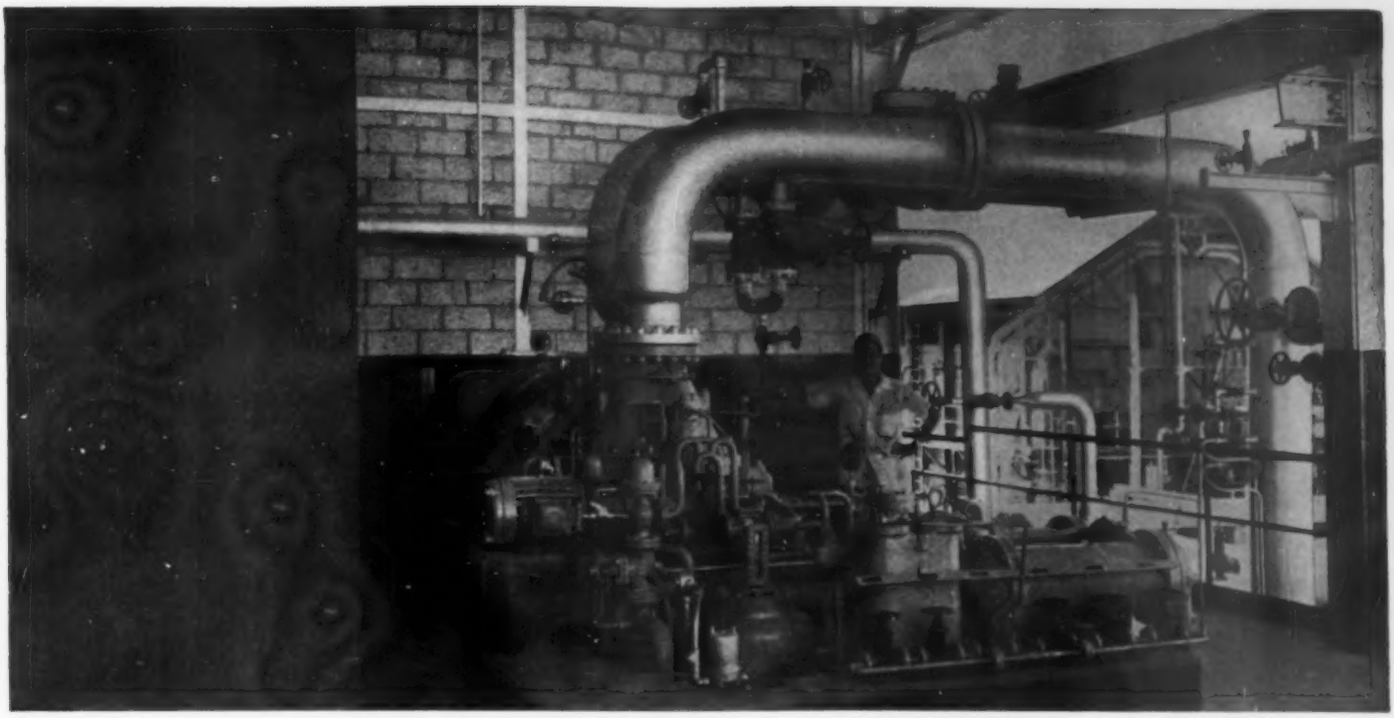
Of the May 1 total, 120,976 tons gross represented vessels built in 1935 and earlier and 188,094 tons built between 1936 and 1946.

At January 1 last 1,976,000 tons gross were laid up, British flag vessels accounting for 422,000 tons and American 237,000 tons.

Reversing the Trend

The tendency of some European governments to look with more favor on investments abroad as their foreign-exchange reserves mount is one reason expressed for the accelerating trend toward investing in USA business. Also contributing to the rise in European investment in the USA are political instability and nationalization threats in some areas where European firms have traditionally operated.

It is estimated Western European concerns now have a total investment of some $3.5 billion in USA plants and other facilities, up from just over $3 billion at the beginning of 1959. New investment of this type is estimated to be flowing into the USA from Europe at a rate over $200 million per year, compared with $70 million a decade ago. For instance, Montecatini, big Italian chemical concern, soon will start turning out polypropylene at its new $10 million plant at Neal, West Virginia.

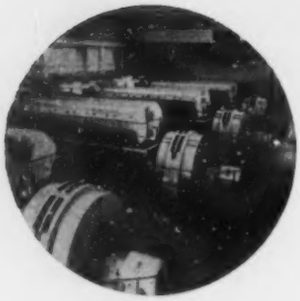


Centrifugal Recycle Gas Compressor with sealing oil system, installed in an oil refinery

ESCHER WYSS
equipment for oil refineries

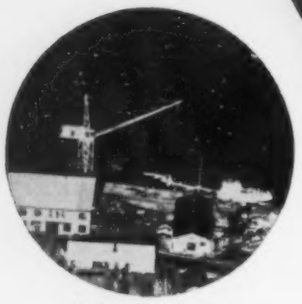
Centrifugal Compressor with Condensing Steam Turbine, supplying combustion air to a fluid hydroformer installed in an oil refinery. Performance: 11,250 cfm, 260 psia, 8150 rpm

Escher Wyss Ltd. Zurich/Switzerland

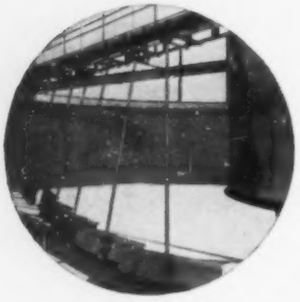


Power Stations

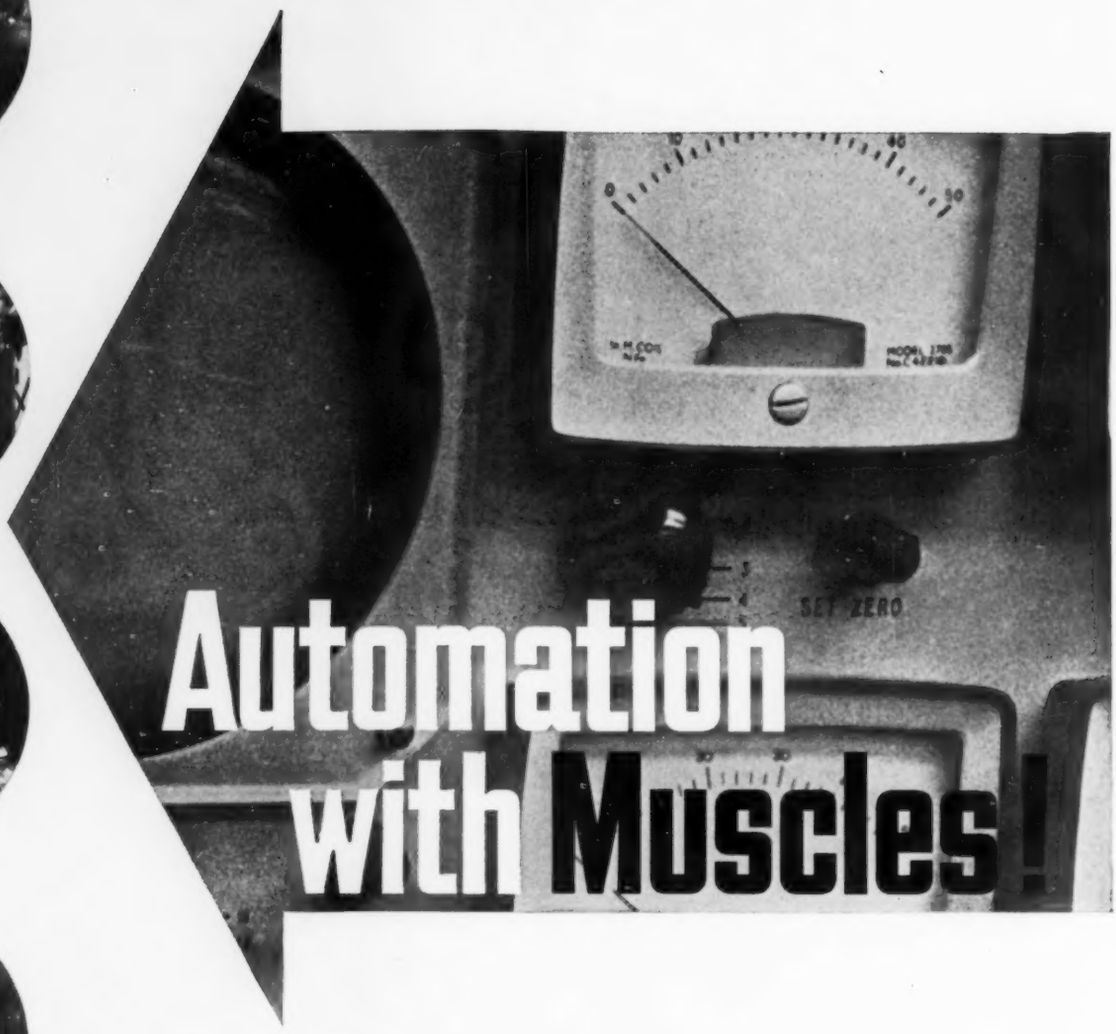
Electrification



Harbour Installations



Sewage Plant



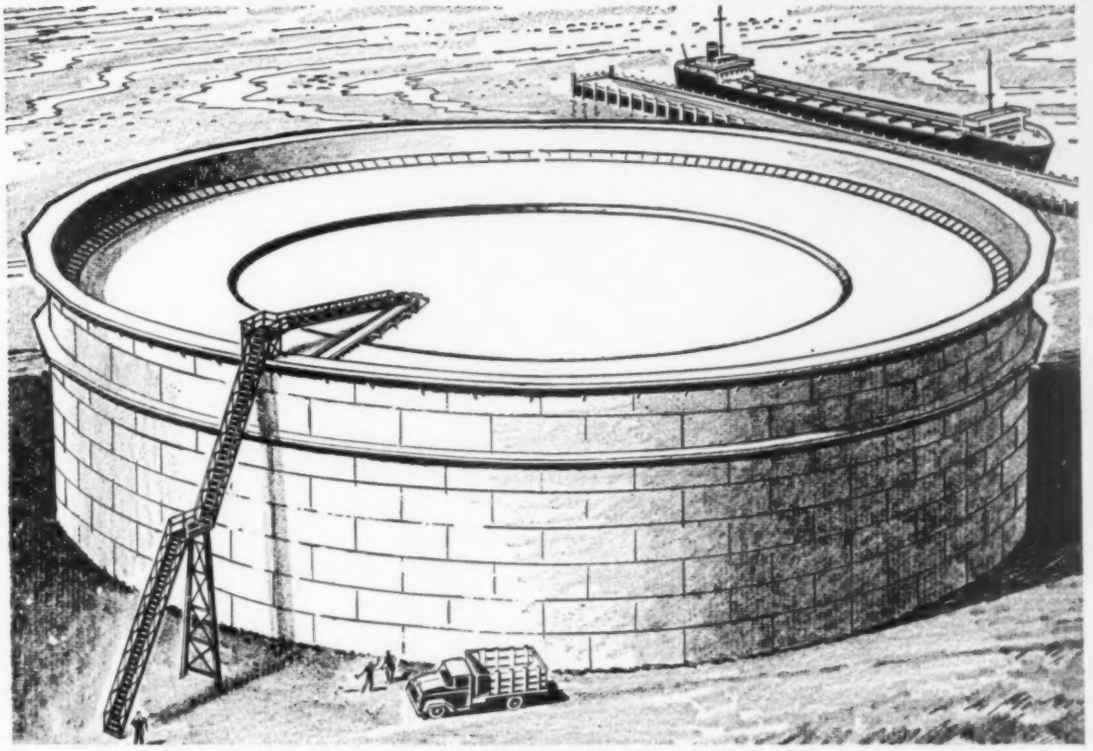
Automation with Muscles!

A NEW CONCEPT IN POWER ENGINEERING

Now, for the first time, comprehensive automated engineering schemes are available from one source — Hawker Siddeley Engineering. Backed by the vast resources of the Hawker Siddeley Group this newly formed Division of Hawker Siddeley Industries Ltd. offers a service unequalled by any other organisation. The advantages of a single supplier with centralised control are now available for electrical power systems, sewage plant, harbour installations, radio telescopes, automatic railway control equipment, automatic warehousing, automated manufacturing plant and telemetry applications. This is "Automation with Muscles". Hawker Siddeley Engineering will engineer and develop any of these schemes, with or without automatic and/or remote control. We have representatives throughout the world. Please write for further information.

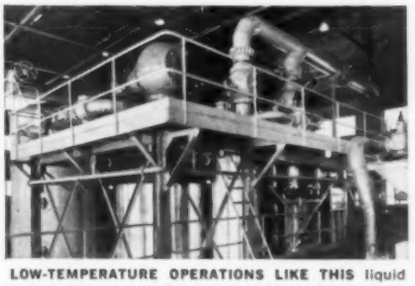
HAWKER SIDDELEY ENGINEERING

Duke's Court, Duke St., St. James's, London, S.W.1. Telephone: WHItehall 6177



Advanced steels that inspire advanced designs

LIQUEFIED METHANE, OXYGEN AND NITROGEN can be moved safely at low temperatures in welded USS 304 stainless steel or 9% nickel steel inner vessels. Steels assure ultra-high purity, minimize heat leaks.



LOW-TEMPERATURE OPERATIONS LIKE THIS liquid oxygen plant use USS low carbon 9% nickel steel for such outstanding characteristics as its moderate first cost, ease of fabrication and excellent notch toughness.

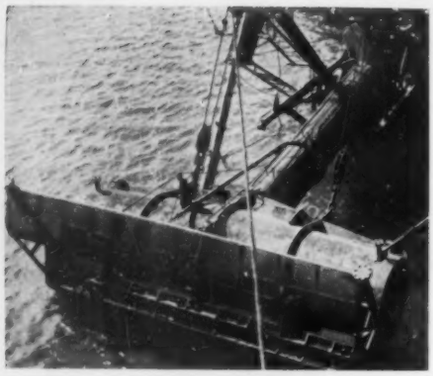
Efficiency and cost-saving were achieved in this new, 600,000-barrel oil tank by specifying USS "T-1"* Constructional Alloy Steel in its construction. Located in Kuwait, on the Arabian Gulf, it stands 64 feet high, is 260 feet in diameter, can fill the largest of the new supertankers in a single stop. The shell consists of six lower 8-foot rings of USS "T-1" Steel, made to 115,000 psi minimum ultimate strength; and a saving of 42% in steel was realized through the use of USS "T-1". Fabricating, shipping and erection costs were similarly reduced, as was the amount of carbon steel needed for two upper rings. This performance and economy story is repeated throughout the world, wherever advanced design specifies the advanced steels from United States Steel Export Company, 100 Church Street, New York 8, New York, U. S. A.

United States Steel Export Company

100 Church Street, New York 8, N. Y., U. S. A.

*TRADEMARKS

OTHER USS SPECIAL STEELS INCLUDE USS COR-TEN* . . . USS TRI-TEN* . . . USS MAN-TEN* . . . USS CARILLOY*



Underwater Asphalt Carpet

Royal Dutch/Shell has developed a machine for preventing erosion due to swiftly flowing water in narrow confines which has already successfully laid asphalt carpets for Dutch coastal sea defense work in water 24 ft deep and flowing 5 ft a second. Trials are now being carried out in 50-60 ft depths. One major problem in this work has been the formation of a firm foundation on which the caissons can be placed for sealing the final gaps in the face of greatly increased tidal currents at this stage. With this device, which is mounted on a shallow draft vessel, hot mastic is fed at the right temperature to a horizontal cylinder. From this the mixture emerges in individual jets that flow together on the bottom to form strips up to 17-ft wide, the thickness of the carpet depending on mixer capacity and vessel speed.

Fossil Fuel Lead to Continue

Twenty years hence fossil fuels (gas, petroleum products, and coal) will still be the prime energy suppliers. This is the conclusion of a detailed study on energy fuels in the USA, 1947-80, to be released soon by Texas Eastern Transmission Corp., just at a time when the federal government is trying to create a special committee to undertake a national fuels study.

The TETC study implies an average growth rate since 1949 of 3.1% in the total end-use need for energy in the four consuming sectors (industrial, motive, residential, and commercial)—with the increase in the next 20 years at a rate 2½ times the rate of increase during the past 10 years.

The study predicts the decline in direct use of coal, even in the industrial category, will be reversed after 1970; and the use of coal for electric-power generation will increase more rapidly than gas or oil between 1960 and 1980.

Total natural gas consumption by 1980 will rise to 23,000 trillion cubic ft, a 3.4% average yearly rise between 1960 and 1980. Daily consumption of petroleum by 1980 to rise to 15 million barrels from nine million in 1959, a 2.5% growth rate.

Consumption of coal in 1949 was 482 million tons, which dropped to 362 million in 1959 for a rate decline of 2.6%; to be completely reversed to an increase of 4½% per year in the rate of consumption from 1960 to 1980 entirely because of power-generation needs.

Nuclear energy, while a reality today though still in development stage for electric generation, "will become economically competitive with fosil fuels only in a few areas of the United States by 1980."

Mandeville President of IBI

Michael L. Mandeville has been appointed president of International Business & Industries, Inc. Mr. Mandeville was formerly president of the International Division of U.S. Industries, Inc. Prior to that he was assistant general manager of sales of the overseas division of Continental Can Co., Inc. and has also been associated with the International Selling Corp. and Signode Steel Strapping Co. in their respective international operations. International Business & Industries, Inc., located at 247 Park Avenue, New York 17, New York, was recently formed. According to Mr. Mandeville, it will engage in manufacturing, trading, and investment opportunities abroad.

K. D. Miller

S. M. Frank

Kellogg Promotes Two

K. Dexter Miller has just been appointed director of mechanical engineering development by The M. W. Kellogg Co. In his new capacity, Miller will be responsible for the mechanical engineering research of the company—a world-wide engineering and construction organization. He is the author of numerous classified reports and published articles, and a member of the American Rocket Society, the Institute of the Aeronautical Sciences, and Sigma Xi. S. M. Frank has been appointed manager, organic chemicals division, M. W. Kellogg Co. Frank will direct the newly-formed division and will be responsible for the economic and technical evaluation and development of process designs for organic chemical plants.

Reed Consolidates

Reed Roller Bit Co. has taken another step toward further diversification and expansion of its operations with the purchase of the Diamond Metal Co. of Houston. Diamond Metal, organized in Houston in 1932, manufactures tungsten carbide surfacing materials and tungsten carbide castings used extensively in the oil tool, mining, quarrying and construction industries; and a line of "tungsten heavy metal" used as a shield against radiation.

Well known for its high-quality materials and service, the firm markets throughout the U.S. and Mexico and in many countries abroad.

Perfection in Protection

Anderson have pioneered outer wrap materials for pipelines using both asbestos and glass fibre bases for use with either coal tar enamels or asphaltic bitumens.

Thermoglas and Bestos pipeline outer wraps have met fully the requirements of major contracts both at home and overseas with such characteristics as strong adhesion and high tensile strength.

THERMOGLAS

PIPELINE OUTER WRAP

Full technical information from:

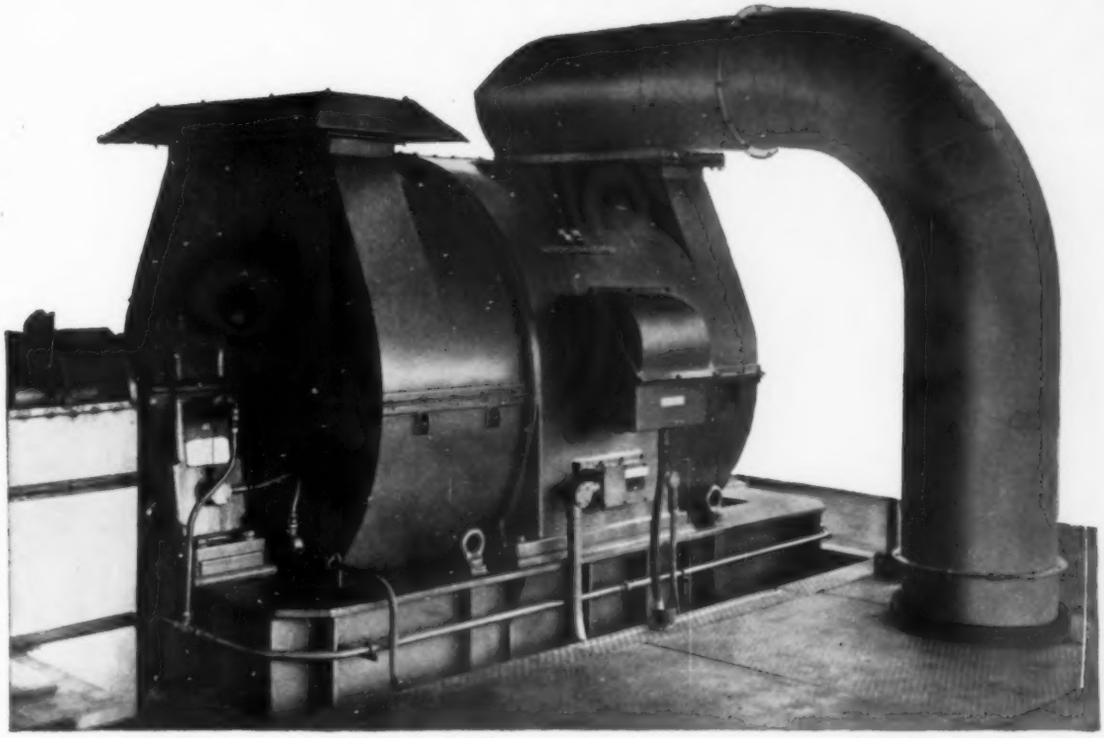
D. ANDERSON AND SON LTD.

Stretford. Manchester Tel: LONgford 4444.

Old Ford. London E3. England Tel: AMHerst 9381.

3000 hp-3000 volts,

Direct-on-line started motors at Fawley



This 3000 hp., 1485 r.p.m., 3kV motor is the largest direct-on power-line started machine to be installed in a British oil refinery; it is a Type AMS, pipe-ventilated, squirrel-cage induction motor and drives the main air compressor on the Hydroformer unit at the Esso Oil Refinery, Fawley. A similar rated machine, but force-ventilated because of the hazard, drives a hydrogen compressor on the same unit.

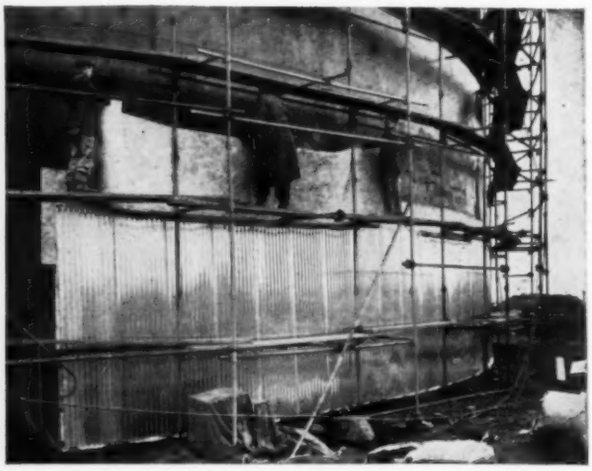
AEI motors are in use in oil refineries throughout the world, complete ranges of such motors have been designed by AEI Engineers to meet the specialized requirements of the oil industry. These motors embody the experience gained over many years and incorporate features which are essential to the oil industry.

AEI

Associated Electrical Industries Limited
Motor and Control Gear Division
RUGBY AND MANCHESTER, ENGLAND

If you want the benefit of ESSO's experience of insulating tanks . . .

LOOK AT THESE TWO PICTURES



They show the method of applying Crown insulation used on the tanks in the new Esso installation at Tynemouth.

First Stud-weld a series of pins to the surface of the tank.

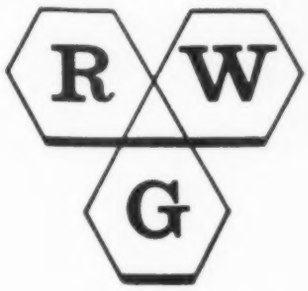
Second Impale Fibreglass Crown insulation on these pins. Because of its high tear strength it will be supported by the pins indefinitely and without sagging.

Third Cover with light-gauge corrugated sheet metal impaled on the same pins and secured by caps crimped over the prepared ends of the pins.

This method is not only effective and good looking but inexpensive. It does away with the separate framing otherwise necessary, and holds the insulation securely to the tank itself. You can learn more about the advantages from . . . .

FIBREGLASS TRADE MARK

FIBREGLASS LIMITED,
ST. HELENS, LANCS.



THE LARGEST VACUUM FLASH EVAPORATORS IN THE WORLD, TO BE BUILT BY RICHARDSONS, WESTGARTH & CO. LIMITED

The Government of Curacao has awarded to Richardsons, Westgarth & Co. Limited a contract for two vacuum flash evaporators, each capable of producing from sea water 1,400,000 Imperial gallons of drinking water a day. These will be the largest evaporators ever built.

Richardsons Westgarth, pioneers of the vacuum flash evaporator in Great Britain, now have in operation or on order:

- Vacuum flash evaporators with the largest individual output in the world.
- Vacuum flash evaporators producing the largest total combined output of fresh water in the world.
- More land based vacuum flash evaporators than any other manufacturer.

With plant in operation in Great Britain, South America and many parts of the Middle East, Richardsons Westgarth experience in this highly specialised field is at the disposal of all who require supplies of fresh water for domestic or industrial use.

Consultants for this contract are Stichting Nederlands Adviesbureau Voor Ingenieurswerken in Het Buitenland, The Hague, in association with Tebodin, Advies-en-Constructionbureau NV., The Hague.

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RW93

T. M. Bennett

G. B. McGuire

Lummus Appoints Bennett

Promotion of Thomas M. Bennett to the position of administrative manager of The Lummus Co.'s engineering development center has been announced.

Prior to his promotion, Bennett was manager of the Pilot Plant Construction Department of the Engineering Development Center. He is a member of the American Institute of Chemical Engineers and the Armed Forces Association.

825 Million Turnover for Weisser Group

Despite active competition in the German market, the Th. Weisser KG Group (including subsidiaries) had a turnover of over DM 100 million (equivalent to about US $25 million) during 1960. The company's sales turnover was below expectations for the year, however, due to the price wars which have characterized the German scene recently.

During 1960 Weisser Group sold approximately 1.2 million tons (about 8.4 million barrels) of products, including 850,000 tons through Messrs. Marquard & Bahls GmbH (Mabanaft). About 8% of the company's deliveries were made directly to major oil companies in Germany, 61% to large and small oil marketers, and 31% directly to consumers.

The company obtained approximately 200,000 tons of the total sold from an Italian refinery under a wages agreement. A further 470,000 tons of about 530,000 tons came from countries of the Communist bloc. The group has included another refining agreement for 1961, and anticipates still another for 1962. This will raise total amounts treated to about 500,000 tons (approximately 3.5 million barrels) in 1962.

The Weisser Group has a total tankage capacity of 320,000 cubic meters in various German harbors, in Antwerp, and Rotterdam in the Netherlands, as well as on the Rhine and the Danube rivers. Capital of Marquard & Bahls GmbH has recently been increased to DM one million (about US $250,000) and several capital increases have been carried out for subsidiaries during the past few years. The Weisser Group expects product sales to amount to about 1.5 million tons (approximately 10.5 million barrels) in 1961.

McGuire Joins Badger

George B. McGuire has recently joined the Badger Manufacturing Co. as vice president and construction manager for all its foreign and domestic construction operations.

Prior to joining Badger Manufacturing Co., Mr. McGuire was assistant director of Esso Research & Engineering Co. In his 24 years with Esso he served in a number of engineering and construction management positions. These were world-wide, involving multi-million-dollar oil refinery and petrochemical plants. He is a civil engineering graduate of Rutgers University.

Speed up Berthing

According to Humble Oil & Refining Co., only 10% of USA oil terminals are deep enough for berthing supertankers (35,000 dwt or more) which require a depth in excess of 36 ft. With more than 70 such vessels under construction or on order, harbor and channel improvement programs must be speeded up. Of 100-odd terminals along the Atlantic Coast, only seven can handle Humble's supertankers; of 75 along the Pacific Coast, only nine have been cleared for berthing such vessels.

NPC Membership Changes

Secretary of the Interior Stewart L. Udall has announced the designation of Reid Brazell, president of the National Petroleum Refiners Assoc., to ex officio membership on the National Petroleum Council.

The newly-formed National Petroleum Refiners Assoc. resulted from the merger of the National Petroleum Assoc. and the Western Petroleum Refiners Assoc., on July 1, 1961. The presidents of these two associations were members of the Council during their tenure of office.

The two executives leaving the Council due to the merger are Rexford S. Blazer, formerly president of the National Petroleum Assoc., and William J. Carthaus, formerly president of the Western Petroleum Refiners Assoc. In letters to each of them Secretary Udall expressed appreciation for their able assistance in the work of the Council.

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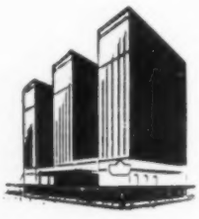

Houston's Welcome to the World

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EXTREME LINE CASING

Stewarts and Lloyds introduce their new Extreme Line Casing Joint, manufactured under licence from the Tubular Division of the National Supply Company. It is produced from selected steels to the high standard of workmanship for which Stewarts and Lloyds' casing is renowned. The features of this new product are fully explained in a booklet 'Extreme Line Casing' which is available on request.

Stewarts and Lloyds, who have a hundred years of steel tube making experience, were the first manufacturers in the world to be licensed by the American Petroleum Institute to apply the A.P.I. monogram to their tubular goods. The Company have been supplying casing to the oil industry since the end of last century.

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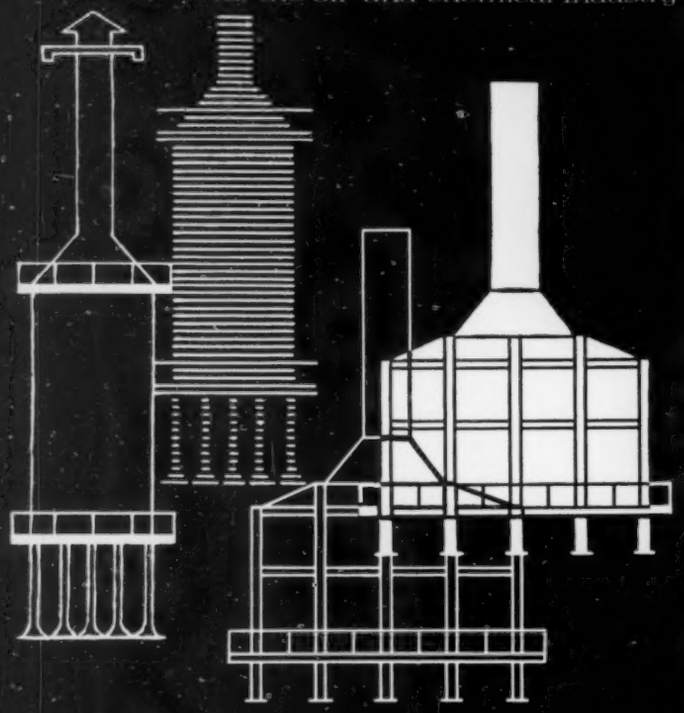

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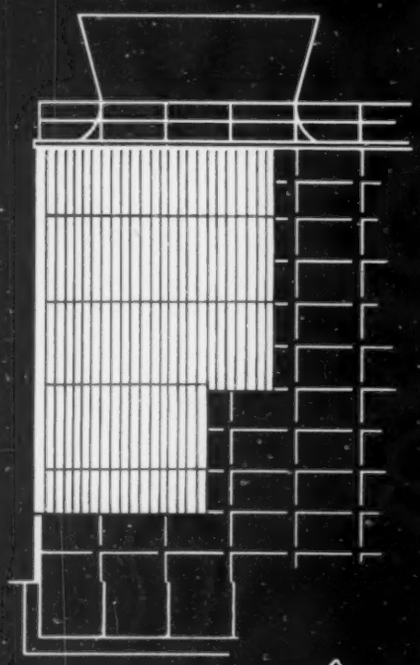

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J. R. L. Williams

D. M. Simecheck

Worthington Appoints Williams

J. R. L. Williams has been elected vice president-European operations, Worthington Corp.

Williams, whose headquarters are in Paris, France, will coordinate all production, engineering, sales and service functions of seven associate companies located in Austria, France, Germany, Italy and Spain. In his new capacity, Mr. Williams will also be responsible for integrating the output of these overseas plants with exports from the United States, and maintaining liaison with a number of European licensee manufacturers.

Jones & Laughlin Changes

Four management changes for Jones & Laughlin Supply division have been announced. W. L. Wolfe, vice president—sales, will move this office from Tulsa to Houston, Texas. The division's top sales direction and sales policies will be administered by Mr. Wolfe from that office. R. J. Woods, Jr., previously director of sales, is appointed assistant to the President at Tulsa. In this capacity, Mr. Woods will assume the chief executive staff position for the division.

Bill Wood, formerly regional manager, Tulsa, is promoted to the newly created position of general manager of sales at Tulsa.

Mr. Wood's duties will encompass many of the duties previously assigned to the director of sales. The four major sales departments in the Tulsa headquarters will now report to Mr. Wood. V. H. Weldon, Jr., formerly assistant manager, tubular products, is assigned as assistant to the vice president—sales at Houston.

Simecheck V. P. at Fish Engineering

Election of Don M. Simecheck as vice president of sales of The Fish Engineering Corp. has been announced. Simecheck has been active for the past eight years in sales engineering and the design and development of numerous hydrocarbon projects undertaken by the Fish companies. Simecheck will direct sales activities of Fish Engineering, particularly in initiation of petrochemical and hydrocarbon processing facilities.

New Gas Compressor

A three-stage air-cooled natural gas compressor designed specifically for oil and gas industry applications is now available from Worthington Corp. This compact, lightweight compressor unit is ideal for packaging into economical, portable skid-mounted units driven by an engine or an electric motor.

Compressor is designed for suction pressures of O-15 psig and discharge pressures from 250 through 600 psig. Capacity up to 145,000 scfd. Compressor Size—Bore Stroke, inches: 6/3-1/2/2-5/16 x 2-3/4. Net weight 550 lbs. Overall Dimensions—L x W x H, inches: 32-9/16 x 25-5/8 x 29. For further information, write Worthington Corp., Harrison, N. J., and ask for Bulletin 3438-B1.

Crane Packing in Mexico

Crane Packing Co. has established manufacturing facilities in Mexico for their extensive line of industrial sealing products, including mechanical packings, shaft seals and pipe thread and gasket compounds. The new company, named Industrias John Crane de Mexico, S. A., was formed by the absorption of an established Mexican manufacturer of conveyors and custom engineered products. Offices and factory are located at Poniente 152 #679 Industrial Vallejo, Mexico D. F.

Offshore Rig to Gabon

The Offshore Co.'s newest mobile, self-elevating drilling platform, designed Rig 59, and its tender No. 3, have been taken under tow by two tugs out of Rotterdam, Holland, and are on their way to location off the coast of Gabon Republic, Africa.

Rig 59 will take part in the first important program of offshore drilling activity ever undertaken in African waters.

Some oil well drilling has been done in the Gulf of Suez, in Nigerian lagoons, and in connection with geophysical surveys elsewhere along the continent, but Rig 59 is the newest mobile, self-elevating deep-water drilling platform going to work full time in Africa.

Rig 59 is the second rig of The Offshore Co. to make use of the compact tri-legged self-elevating design and special tender vessel. It elevates the platform above the water for drilling by means of The Offshore Co.'s new floating hydraulic offshore jacks, which raise the rig into position and later lower it for changes in location.

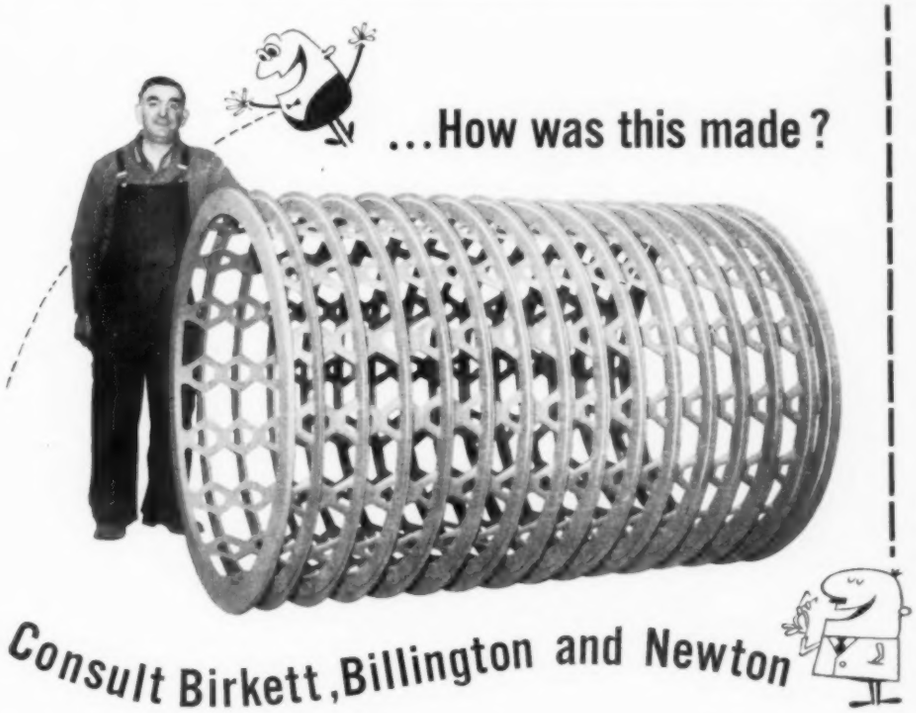
Selas in Australia

Major Furnace and Combustion Engineers Pty. Ltd. of Melbourne, Australia, has been licensed to build and sell Selas heat processing equipment for the steel, chemical, petroleum, and other industries located in that country, according to an announcement by James S. Shute, Manager of Export Division, Selas Corp. of America, Dresher, Penna.

All equipment covered by the agreement, whether sold and/or built by Major, will be engineered by Selas.

Halliburton Executives to Dallas

Five officers of Halliburton Co. including L. D. Campbell, chairman, and L. B. Meaders, president, will move to Dallas, Texas from Halliburton's longtime Duncan, Oklahoma headquarters. The recommendation was made by Halliburton's board. Other officers included are R. G. Kelly, senior vice president, John P. Harbin, financial vice president and Marvin Brummett vice president and secretary.



This intricate hollow design casting in aluminium-bronze is only one of the many different specials regularly produced each week by the BIRSO foundries. Welded together from six separate sections to make a complete unit measuring 6 ft. by 4 ft., the design is a patent of W. Knowles Trotman and used in the manufacture of paper and board throughout the world. We are specialists in the casting of specials — contact us today for full details of our facilities — and if you've a really difficult casting specification, send that too.

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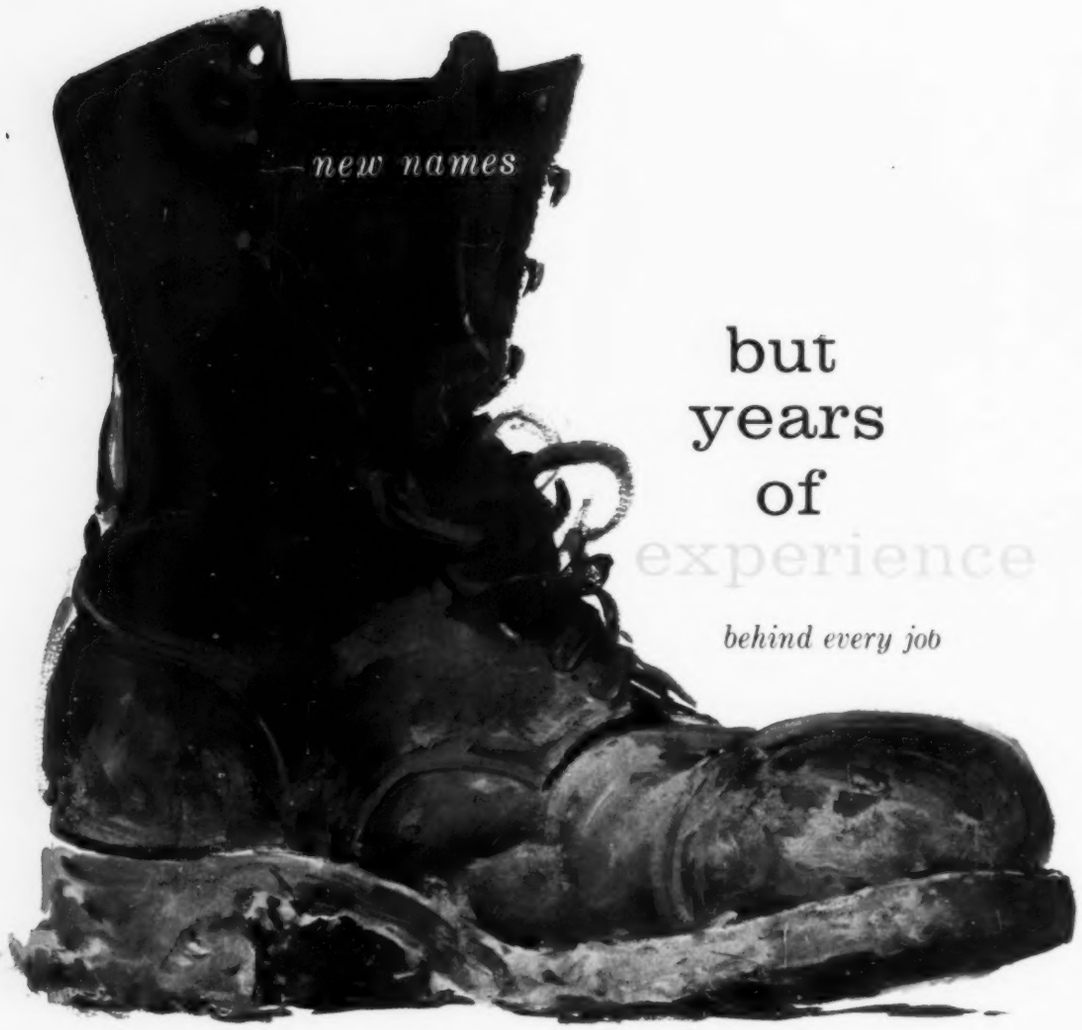

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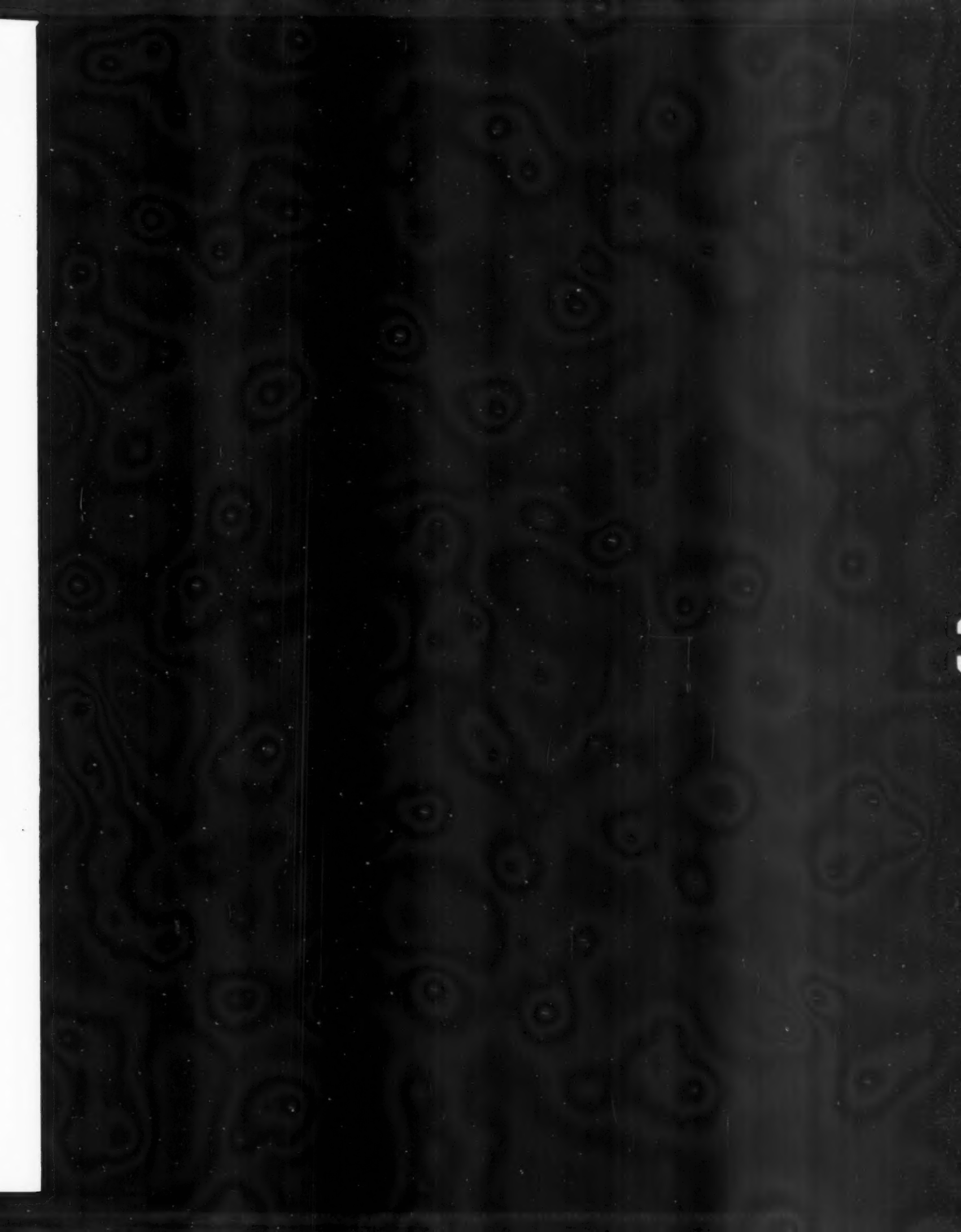
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